OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

NOVEMBER 26, 1951
VOLUME 40, No. 24

AMERICAN DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY · BLEACHING · DYEING · PRINTING · FINISHING

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The services of the Development and Service Department are available to aid you in your selection.

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or how NULLAPON *came to the rescue*

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- **Removes metals and metal stains from fabrics.**
- **Aids dyeing with metal-sensitive dyes and hard water sensitive vat dyes.**

If the Trace Metal Gang is operating in your plant, call upon Nullapon immediately. For Technical Bulletin—and for information regarding test kits to determine water hardness—please call or write.

Nullapon—Reg. U. S. Pat. Off.

The
TRACE METAL GANG

Ca—alias Calcium	Pb—alias Lead
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Fe—alias Iron	Zn—alias Zinc
Cu—alias Copper	Cr—alias Chromium

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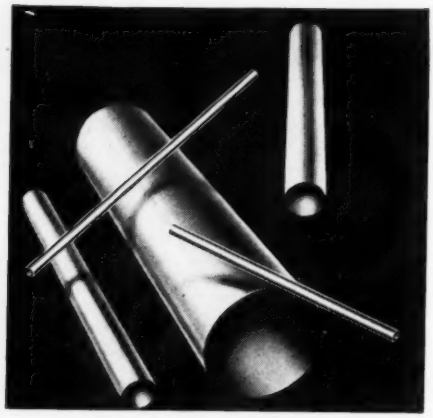

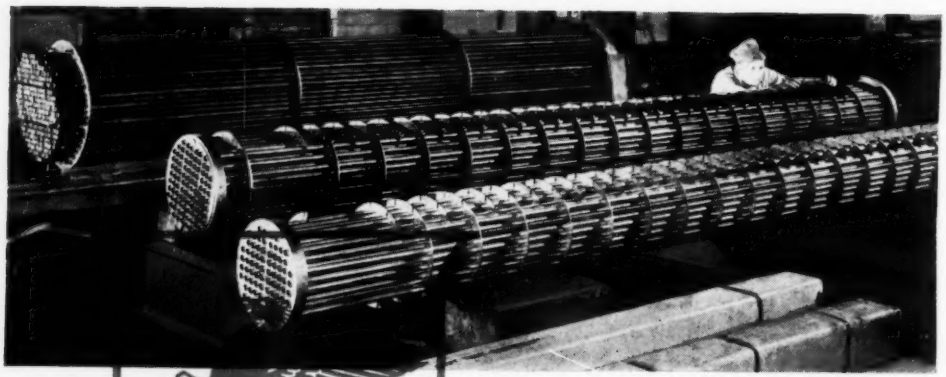

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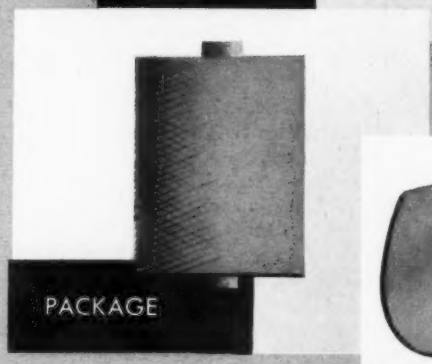
cut cotton-dyeing costs with Nacconol*



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Faster wetting out. Better dye penetration.
More level dyeing—fewer streaks in finished goods.
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NACCONOL is the only low-priced, mass produced synthetic detergent made by a dyestuffs concern and meeting the quality standards of the dyestuffs industry. More NACCONOL has been used in the textile industry for more years than any other synthetic detergent. For predictable performance in wet-processing or finishing operations, order NACCONOL from our nearest office.

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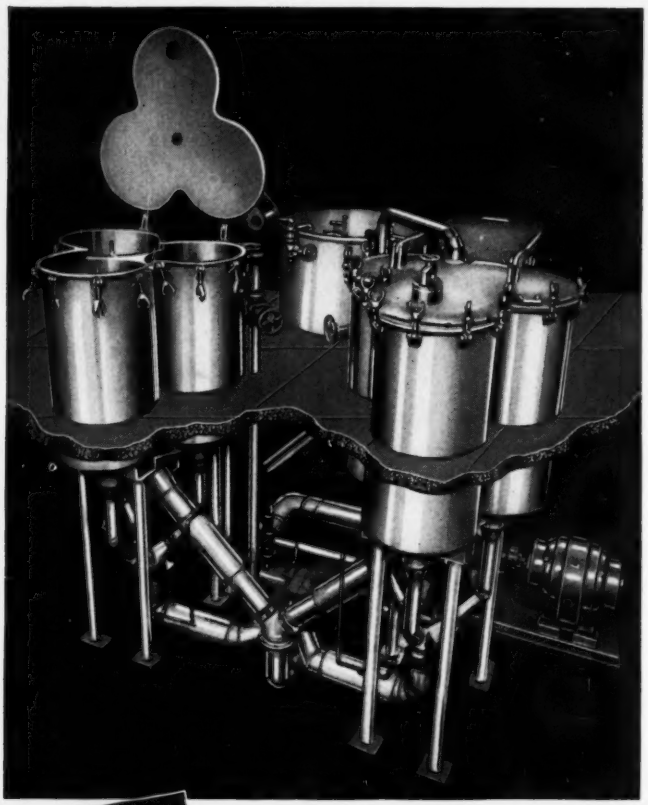
Now... as many as 6 Beams or Yarn Carriers

Can be Dyed at the Same Time in the Same Dye Bath!



Uniform dyeing of yarn on beams or in packages can be attained only when each and every beam or package carrier of yarn is dyed simultaneously under identical conditions. And identical conditions can be assured only in the same dye bath. The SMITH-DRUM Combination Beam and Package Dyeing Machine was the first to make this possible and practical . . . by providing two-kier and three-kier machines . . . designed so that up to the full capacity of the machine, all the beams or yarn carriers are subjected to the same dye bath and the same dyeing conditions of pressure and temperature, all at the same time. Then, a few years later, the same principle was employed in a four-kier machine.

Now . . . a *six-kier* machine is available, which permits dyeing not only two, three or four but up to *six* beams or yarn carriers at *one time* . . . in the *same* dye bath . . . with the *same* liquor ratio . . . under the *same* operating conditions of flow, pressure and temperature . . . and with uniform distribution of additions to the dye bath. Arrange for one of our representatives to discuss these important features with you . . . a letter, 'phone call or wire will receive our prompt attention.

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Wyandotte Chemicals
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DEVELOPMENT NEWS

New Specialized Grade of Sodium CMC Shows Great Promise in Sizing, Finishing and Printing

Carbose* I, recently developed by Wyandotte, is a technical grade of Sodium CMC manufactured under controlled conditions for consistent uniformity. Pilot tests and reports from users reveal that Carbose I does an excellent job as an additive and a finishing agent. Benefits range from product improvements to processing savings of time, trouble and money. Consensus of opinion is that there are many other applications for its profitable application, and Wyandotte's Development Department is receiving requests for samples that indicate more than an ordinary interest in this product. Carbose I is in good supply at a competitively low price.

Carbose I in Warp Sizing

Extensive mill evaluations show that Carbose I is a valuable additive to starches for sizing viscose rayons, rayon-cotton blends and cottons. The optimum concentration of Carbose I in these formulations ranges from 1 to 25%, depending on the proposed application.

Carbose I not only helps form a protecting film, but also reduces stiffness. In most cases, no supplementary softener is required. In addition, the solubility of Carbose I makes desizing the warps and cleaning the slasher easier.

Carbose I in Finishing

By insolubilizing it with the addition of an aluminum salt, such as alum, Carbose I may be used in concentrations of 2 to 5% as a finishing agent. The product is not only highly resistant to scouring, but also gives the fabric an attractive hand.

Send Coupon for Sample —Test It Yourself!

Further information about Carbose I, its applications and a sample may be obtained by sending in the coupon at right. A sample of Carbose IM is also yours for the asking.

Carbose I Available in Quantity and Low in Price

In these uncertain times, it's to a user's advantage to have a steady source of supply of essential materials. This helps him maintain both the volume and quality of his production. Carbose I is available in quantity and at a competitively low price.

Carbose IM in Printing Pastes

Carbose IM, a special form of Carbose I, has proved itself efficient for printing with insoluble azo colors, soluble vat colors, direct and acid colors on cotton, wool, silk and synthetics.

The thickener is quite soluble and easily removed from the cloth by a cold-water wash. Like Carbose I, Carbose IM is consistently uniform.

*REG. U. S. PAT. OFF.

Wyandotte
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DEVELOPMENT DEPARTMENT, AD-11

WYANDOTTE CHEMICALS CORPORATION, Wyandotte, Michigan

Please send me further information and a sample of ☐ Carbose I . . . ☐ Carbose IM.

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Company_____

Address_____

City_____ **State**_____

NUODEX Textile Fungicides

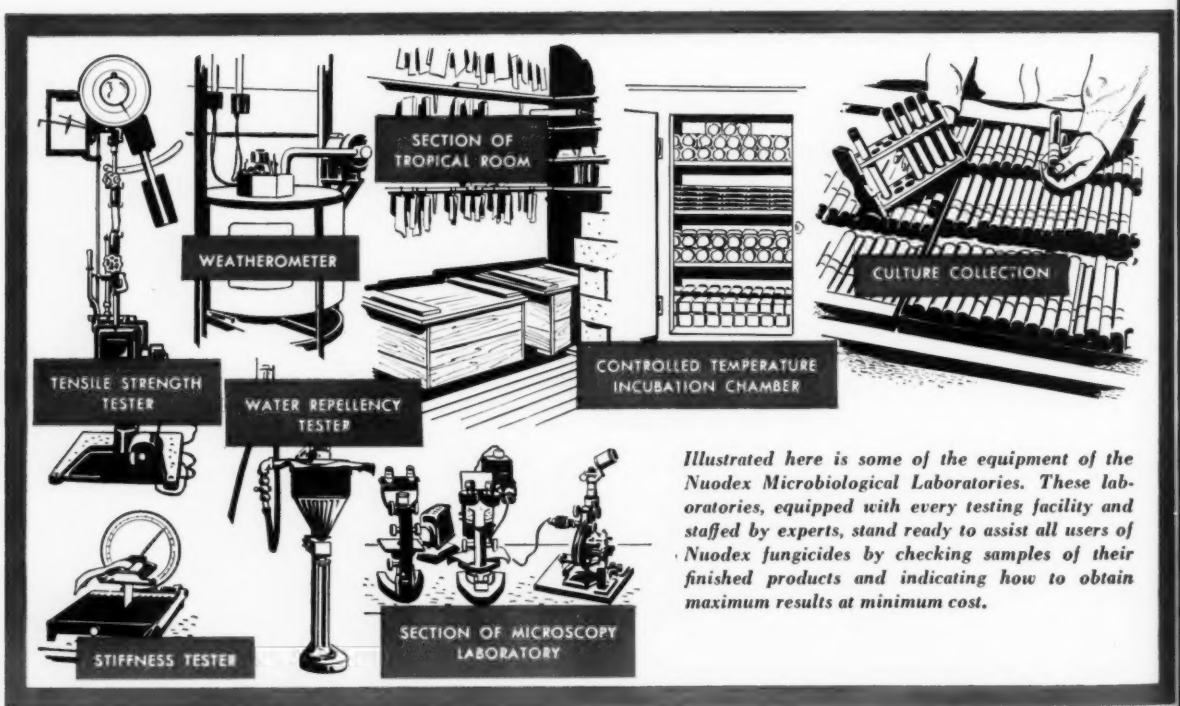
MEET ALL MAJOR

Government Specifications

ONLY NUODEX brings you fungicides that enable you to meet every major U. S. Army, Navy, Air Force, Coast Guard, and Federal Specification for mildew-resistant treatment of textiles and cordage.

A pioneer in fungicide research, and holder of the Army-Navy "E" for production of mildewproofing and rotproofing agents during World War II, Nuodex offers a complete and diversified line of textile fungicides — naphthenates, non-naphthenates, metallo-organics, and organics, in solvent soluble and water dispersible form. From these you can prepare formulations exactly suited to your needs.

Whatever your mildew-proofing problem for military fabrics — webbing, tentage, tarpaulins, burlap, sandbags, netting, cordage — see Nuodex *first*. We'll make recommendations based upon your specific requirements, and advise how to apply Nuodex fungicides to very best advantage.



Illustrated here is some of the equipment of the Nuodex Microbiological Laboratories. These laboratories, equipped with every testing facility and staffed by experts, stand ready to assist all users of Nuodex fungicides by checking samples of their finished products and indicating how to obtain maximum results at minimum cost.

IF YOU HAVE A FUNGICIDE PROBLEM — SEE NUODEX *FIRST*

NUODEX TEXTILE FUNGICIDES – The Most Complete Line in the Industry

NUODEX COPPER 6%
Copper naphthenate in mineral spirits containing 6% copper metal

NUODEX COPPER 8%
Copper naphthenate in mineral spirits containing 8% copper metal

NUODEX COPPER HOH-6
Ammoniacal solution of normal copper naphthenate containing 6% copper metal

NUODEX COPPER NOH-11
Combination of normal and copper hydroxy naphthenates containing 11% copper metal (U.S. Patent)

NUODEX COPPER S-18
Mineral spirits dispersion of copper hydroxy naphthenate containing 18% copper metal (U.S. Patent)

NUODEX COPPER QN 18%
Combination of copper hydroxy naphthenate and copper 8-quinolinolate containing 18% copper metal (U.S. Patent)

CORDEX
Copper naphthenate in cordage oil containing 8% copper metal

NUODEX COPPER OLEATE 8%

NUODEX ZINC 8%
Zinc naphthenate in mineral spirits containing 8% zinc metal

QUINDEX
Solubilized copper quinolinolate in 10% concentration (Patent Pending)

QUINDEX W.R. 10%
Quindex combined with water repellents (Patent Pending)

QUINDEX EMULSION BASE
Quindex in a form emulsifiable with water (Patent Pending)

NUODEX MERCURY 25%
Mercury naphthenate containing 25% mercury metal

NUODEX 100 S.S.
Colorless, odorless, non-toxic organic fungicide in solvent soluble form (U.S. Patent)

NUODEX 100 W.D.
Nuodex 100 in water dispersible form (U.S. Patent)

NUODEX 100 CONCENTRATE
Nuodex 100 in cencentrated form for use in vinyl coatings (U.S. Patent)

You can meet all Government specifications covering current major procurements requiring mildew-resistant treatment of textiles with one or another of the complete line of Nuodex fungicides. To take some important examples:

Specification No.	*Nuodex Fungicide*	*Specification No.*	*Nuodex Fungicide*
MIL-T-11293	NUODEX COPPER 8% or QUINDEX	24-C-20	Performance specification. Consult Nuodex for recommendations.
MIL-D-10860	NUODEX COPPER NOH-11 or NUODEX COPPER S-18 (Nuodex hydroxy copper naphthenates) or NUODEX COPPER 8% (These fungicides to be used with slight additions of other Nuodex fungicides. Consult Nuodex for specific recommendations). Also permissable NUODEX COPPER QN 18% or QUINDEX.	MIL-R-16060	CORDEX
		MIL-R-1670	NUODEX COPPER 8% or CORDEX or QUINDEX
		MIL-M-5658	QUINDEX
		JAN-W-530	NUODEX COPPER 8% or QUINDEX W.R. 10%
MIL-F-4143	NUODEX 100 CONCENTRATE or QUINDEX	JAN-D-504	NUODEX COPPER 8% or QUINDEX

This abstract of certain U. S. Government Specifications for Textiles and Textile Products Requiring Fungicides lists 116 Armed Forces' Specifications for mildew-resistant treatment of textiles, by number, title and issuing agency. In each instance, the name and concentration of the applicable NUODEX fungicide (or fungicides) is supplied—making a handy guide and reference for manufacturers and processors in the textile and cordage industries. Send for your FREE COPY today.

And remember, Nuodex fungicides help you produce merchandise for civilian uses that has a *plus value* which assures consumer preference, lasting customer satisfaction, *increased sales.*

NUODEX PRODUCTS CO., INC.
ELIZABETH F, NEW JERSEY

NUODEX PRODUCTS CO., INC.
Elizabeth F, New Jersey
Gentlemen:

Please send me a copy of your ABSTRACT OF CERTAIN U. S. GOVERNMENT SPECIFICATIONS for TEXTILES AND TEXTILE PRODUCTS REQUIRING FUNGICIDES; also the data sheet(s) indicated here: _____
write name of fungicide(s)

Name _____ **Title** _____

Company _____

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Designed for the Future

Before a great new bridge is built its future is planned for many years to come. Planning just for *today's* requirements can be dangerous and costly whether it's bridges or processing equipment. The phenomenally rapid growth of the newer man-made fibers makes planning for *tomorrow's* processing needs imperative.

For the processor of modern fabrics, foresight dictates a choice of the most up-to-date equipment available. Looking beyond the present, V. V. designers have built into this heavy-duty padder advanced engineering features that will make it a standard of quality and performance for years to come. Specify Van Vlaanderen.

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World's largest manufacturer of machinery for processing modern fabrics

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FASTNESS

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. . . an extremely level-dyeing acid yellow brown, high in wet processing fastness.

The all-around fastness of ERIO FAST BROWN 5GL* makes it ideal as the yellow component in combination with the fastest-to-light, level-dyeing reds and blues for obtaining delicate mode shades with the highest light resistance.

Additions can be made safely because of its level-dyeing property and the fact that it blends subtly rather than causing such drastic shade change as would result from the use of the conventional yellows.

The new color is suitable to all applications in piece and yarn dyeing requiring light-fastness and good wet-fastness, including dress goods, raincoat fabrics, carpets, rugs, upholstery and automotive fabrics, knitting yarns and hats.

Samples are available — write for them, and descriptive Bulletin No. 30G

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Spur customers to action at the point of sale.
Get Indigosol Violet IRRN . . . and profit!

Our application laboratories are daily solving new, difficult color-matching problems through the accuracy of precision padding and printing. Years of experience and research have equipped us to furnish the exact color you require . . . *exactly* — with speed, efficiency, economy. Write us now for full information.

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VOLUME 40 NUMBER 24

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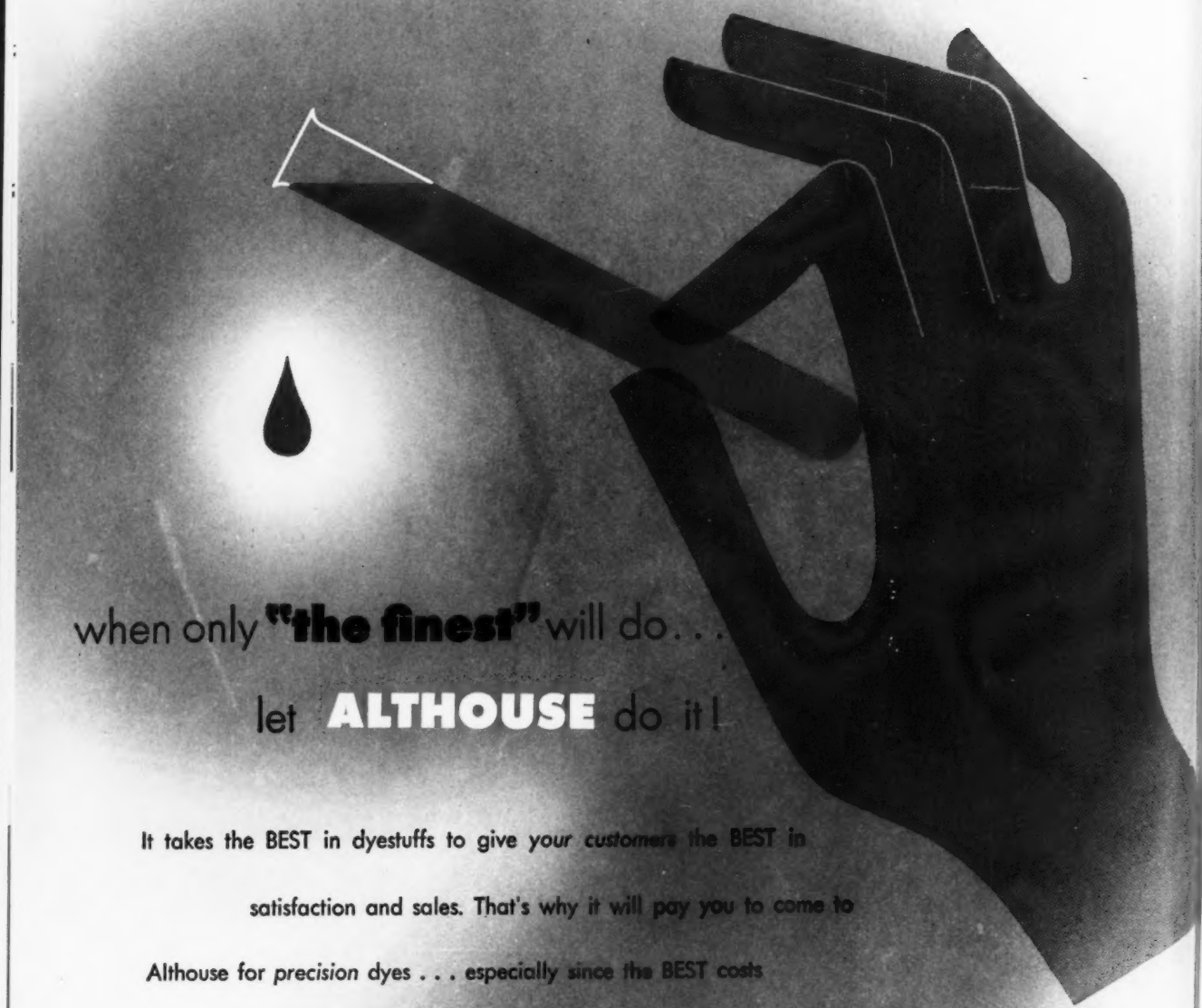

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Chemical Company, Inc.
READING, PENNSYLVANIA

pace-setter in precision dye-making

Proceedings of the
American Association of Textile Chemists and Colorists

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NOVEMBER 26, 1951

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Calendar of Future Meetings

COUNCIL: Jan 18, 1952; April 18, 1952; June 20, 1952; Sept 19, 1952 (all in New York): Nov 6, 1952 (Boston).

GENERAL RESEARCH COMMITTEE: Dates and sites are the same as the Council's.

NATIONAL CONVENTIONS: 1952—November 6-8, Boston, Mass; 1953—Sept 17-19, Hotel Stevens, Chicago, Ill; 1954—Atlanta, Ga.

HUDSON-MOHAWK SECTION: Dec 7, Feb 1, 1952, Mar 21, 1952, May 2, 1952 (all at Jack's Restaurant): June 20, 1952 (Annual Outing).

NEW YORK SECTION: Nov 30 (Swiss Chalet); Jan 11 (Hotel New Yorker); Feb 29 (Hotel McAlpin, New York); April 18 (Swiss Chalet); May 16 (Swiss Chalet); June 20 (Outing).

NORTHERN NEW ENGLAND SECTION: Nov 30 (Annual Meeting, Boston, Mass), Jan 25 (Boston); Mar 7 (MIT); April 18 (LTI); May 16 (Andover Country Club); June 6 (Annual Outing, Merrimack Valley Country Club); Dec 6 (1952 Annual Meeting, LTI).

PACIFIC SOUTHWEST SECTION: Jan 11, 1952; March 28, 1952.

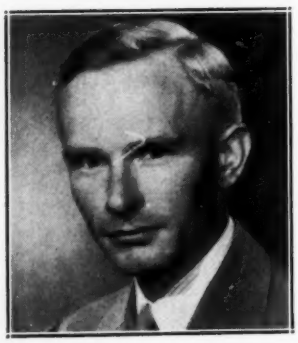
PHILADELPHIA SECTION: Dec 7, Jan 18, 1952 (both at Kugler's Restaurant, Philadelphia).

SOUTH CENTRAL SECTION: Dec 1 (Hotel Patten).

SOUTHEASTERN SECTION: Dec 8 (La Grange, Ga).

WESTERN NEW ENGLAND SECTION: Dec 14 (Rapp's Restaurant, Shelton, Conn).

FIRST A D R AWARD PRESENTED TO HAYEK AND CHROMEY



Mason Hayek

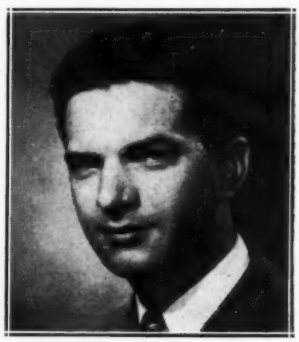
The first presentation of the AMERICAN DYESTUFF REPORTER award has been made to Drs Mason Hayek and Fred C Chromey of the Jackson Laboratory of E I du Pont de Nemours & Co Inc, Deepwater Point, New Jersey. Announcement of the Award was made at the Annual Banquet of the 30th National Convention of the AATCC at the Hotel Statler, New York, on October 19th, by Professor Percival Theel, Chairman of the Association's Publications Committee. The paper chosen to receive the first A D R Award was entitled "The Measurement of Static Electricity on Fabrics" and was published in the March 5, 1951 issue. The paper had been presented before the Auxiliaries and Testing Group Meeting at the Portsmouth National Convention in 1950 by Dr Hayek.

Dr Hayek was born in St Paul, Minnesota, on March 28, 1920 and is a graduate of both the University of Minnesota and Indiana University. His undergraduate work was done at Minnesota where he earned the degree of B Chem in 1941; later he entered Indiana University, completing the requirements for the Master's degree in 1943. During the period 1943 to 1945 he was employed with Joseph E Seagram and Sons, Inc, Louisville, Kentucky, as research chemist. In September, 1946, he returned to Indiana University in pursuit of his Doctor's degree in Organic Chemistry which was awarded him in June, 1947. He then joined du Pont and at present is Group Leader in charge of research concerned with textile chemicals at the Jackson Laboratory. Dr Hayek resides with his wife and child in Wilmington, Delaware.

Dr Chromey was born in Philadelphia, Pennsylvania, on June 30, 1918 and received his B S degree in Physics in 1940 at St Joseph's College. From 1940 to 1942 he attended Indiana University, subsequently entering Cornell University where he was awarded his PhD in Physics in 1943. During the war years he was engaged in atomic research at the Los Alamos Laboratories, Los Alamos, New Mexico. He is an expert in his field and regarded as one of the country's outstanding physicists. He has been at the Jackson Laboratory since February, 1946, and resides with his wife and four children in National Park, near Woodbury, New Jersey.

* * *

The AMERICAN DYESTUFF REPORTER Award was endowed by the Howes Publishing Company as a memorial to Alfred P Howes, Founder of the ADR. Its purpose is to encourage the presentation of the best possible papers before local and national meetings of the Association. The Award, $200 annually, is presented to the author or authors of the paper considered best in the opinion of the judges. Any technical paper presented before a local or national meeting of the AATCC and published in the *Proceedings* as they appear in the AMERICAN DYESTUFF REPORTER is eligible with the following exceptions: Intersectional Contest papers, papers by employees of the AATCC, reports of work substantially subsidized by AATCC, or reports of research committees.



Fred C Chromey

It is a condition of eligibility that the paper have its first publication in the *Proceedings*. Papers published in the *Proceedings* from July 1st of one year to June 30th of the next year are considered in each judging period.

The Chairman of the Publications Committee appoints a committee of 3, other than members of the Publications Committee and representing diversified textile interests to select the papers which, in their opinion, are the best published. The Publications Committee then selects the one from this group which, in its opinion, is the best. Serving on the screening committee for the past year were: Hugh Christison, Harold M Chase and Professor Ethel L Phelps. Papers are judged upon the following basis: originality, scientific value, practical value, and presentation of material as published.

AUDITOR'S REPORT

TO the Members of the American Association of Textile Chemists and Colorists:

We have made an examination of the accompanying statement and supporting schedule summarizing the receipts and disbursements of the treasurer and secretary of the American Association of Textile Chemists and Colorists for the year ending July 31, 1951. In connection therewith, we examined or tested the cashbooks and other records supporting the receipts and disbursements, by methods and to the extent we deemed appropriate, but we did not communicate with the members to confirm the amount of recorded receipts from dues and subscriptions.

In our opinion, the accompanying statement, together with the supporting schedule, fairly summarizes the recorded receipts and disbursements of the Association for the year ending July 31, 1951 and the balances of cash in banks, advance expense funds, and securities owned as of that date.

PRICE, WATERHOUSE & CO

Boston 10, Mass
September 20, 1951

TREASURER'S REPORT

TREASURER'S REPORT

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

STATEMENT SUMMARIZING RECEIPTS AND DISBURSEMENTS FOR THE YEAR ENDING JULY 31, 1951

		Allocation of Funds								
			Special Research Projects							
	Total	General Research	Philadelphia Section Research Project	Flammability Project	American Dyestuff Reporter Prize Award Fund	American Viscose Co Scholarship Fund	Olney Library Fund	Olney Medal Fund	Technical Supplies	General
Receipts:										
Membership dues:										
Corporate memberships	$ 44,435.00	$ 42,312.50								$ 2,122.50
Sustaining memberships	885.00	885.00								...
Senior, Junior, Associate and Student Memberships	45,318.00	...								45,318.00
Total membership dues	$ 90,638.00	$ 43,197.50			$ ...			$ ...	$ ...	$ 47,440.50
American Dyestuff Reporter—Prize Award Fund	2,000.00	...			2,000.00			...	...	...
Annual meeting registrations—net amount received from Rhode Island Section	1,489.14	...			...			...	...	1,489.14
Dividends and interest received	4,033.50	1,948.00			72.50			330.50	...	1,682.50
Miscellaneous income, per accompanying schedule	13,977.35	605.18			...			...	13,372.17	...
Total receipts	$112,137.99	$ 45,750.68			$2,072.50			$ 330.50	$13,372.17	$ 50,612.14
Disbursements:										
Research salaries and expenses	$ 45,415.70	$ 45,291.40					$124.30	$ ...	$ ...	$ ...
Howes Publishing Company—Subscriptions to American Dyestuff Reporter	16,715.00	...					...	...	45.00	16,670.00
Disbursements for account of Olney Medal Fund	78.27	...					...	78.27	...	...
Secretary's expenses, clerical assistance, etc.	21,708.29	...					...	...	5,444.24	16,264.05
Printing, etc.	79.14	...					...	...	...	79.14
Publicity	424.03	263.84					...	...	...	160.19
Purchases of technical supplies for resale	7,270.83	...					...	...	7,270.83	...
Accountants' fee	400.00	...					...	...	...	400.00
Section membership allowances	3,150.75	...					...	...	...	3,150.75
Trade association dues	170.00	...					...	...	...	170.00
Bonds for treasurer, assistant treasurer, and secretary	150.00	...					...	...	...	150.00
Other general expenses	1,942.19	...					...	...	...	1,942.19
Total disbursements	$ 97,504.20	$ 45,555.24					$124.30	$ 78.27	$12,760.07	$ 38,986.32
Excess (deficiency) of receipts over disbursements	$ 14,633.79	$ 195.44			$2,072.50	$ ...	($124.30)	$ 252.23	$ 612.10	$ 11,625.82
Transfer between funds	...	(1,737.53)	$ ...	$1,737.53	...	...	...	...	...	...
Cash in banks, advance expense fund and investments (at cost), July 31, 1950	235,283.18	114,022.74	2,000.00	(1,737.53)	2,000.00	1,424.77	385.88	5,868.72	5,434.42	105,884.18
Cash in banks, advance expense funds and investments (at cost), July 31, 1951	$249,916.97	$112,480.65	$2,000.00	$ ...	$4,072.50	$1,424.77	$261.58	$6,120.95	$ 6,046.52	$117,510.00

Summary of cash in banks, advance expense funds and investments at July 31, 1951:	
Cash in banks	$ 91,316.36
Advance expense funds	1,763.34
United States Savings Bonds, Series F (value at maturity, $40,000; redemption value at July 31, 1951, $36,170) at cost	29,600.00
United States Savings Bonds, Series G, (face value $22,000; redemption value at July 31, 1951, $20,936), at cost	22,000.00
$10,000 United States Treasury Bonds 2½% 1967-72 at cost (value based on market quotations July 31, 1951, $9,706)	10,017.68
$30,000 United States Treasury Bonds 2% 1951-53, at cost (value based on market quotations July 31, 1951, $30,038)	30,403.13
$25,000 Commonwealth of Massachusetts, Metropolitan Water District Bonds 1¼% due October 1, 1952, at cost (value based on market quotations July 31, 1951, $25,062)	25,486.41
Other marketable securities, at cost (value based on market quotations July 31, 1951, $47,991)	39,330.05
	$249,916.97

Respectfully submitted:
ALBERT E SAMPSON, Asst Treasurer
American Association of Textile Chemists and Colorists

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS
SCHEDULE OF MISCELLANEOUS INCOME FOR THE YEAR ENDING JULY 31, 1951

Research:		
Launder-Ometer royalties	$ 365.00	
Gain from sale of securities	240.18	$ 605.18
Sales of technical supplies, royalties, etc.:		
Yearbooks	$2,021.74	
Dye standards	239.00	
Knitted tubing	536.45	
Dyestuff Reporters and reprints	152.85	
Crock-meter cloth	2,093.30	
Crock meters	2,181.54	
Moth cloth	909.41	
Multi-fiber cloth royalties	1,049.58	
Flammability tester royalties	31.00	
Water-test apparatus	784.75	
Gas fading units	230.50	
Color transference charts	452.00	
Analytical methods	2,240.40	
Buttons	28.00	
Colour Index	330.00	
Cotton skeins commissions	73.65	
Standard grease wool	18.00	13,372.17
Total miscellaneous income		$13,977.35

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

51-35

Education: B S in textile chemistry and dyeing, Lowell Textile Institute.
Experience: chemist; speaking and reading knowledge of French.
Age: 29; single with one dependent; references; any geographical location acceptable.

11-26, 12-10

51-39

Education: M S, textile technology.
Experience: engineer, testing, product and process development in cotton printing and finishing.
Age: 24; married; references; any location in U S, acceptable.

11-26, 12-10

51-41

Education: B S Chemistry, New Bedford Textile Institute.
Experience: textile inspector.
Age: 24; single; references; position as textile chemist desired, location not restricted.

11-26, 12-10

51-42

Education: High School; chemistry in U S Army.
Experience: Dyer.
Age: 35; married; references; Central Atlantic coast or South preferred.

11-26, 12-10

51-43

Education: B S, N C State College.
Experience: Textile technician, clothing stores.
Age: 31; single; references; vicinity of New York City preferred.

11-26, 12-10

(Photo by Kenneth C Everett)

Dr W George Parks (right) of the University of Rhode Island's Chemistry Department describes some of the exhibits associated with the Rhode Island Section's Intersectional Contest Paper to Raymond Mace, technical director of the Crown Division, Crown Manufacturing Company. The exhibits were on display at the October 26th meeting of the Rhode Island Section, which was held in the Providence Engineering Society Building, Providence, R I.

Dr Parks read the Contest Paper (prepared under the chairmanship of Edward M Gamble) following Mr Mace's talk on "The Manufacture and Control of Wool-Synthetic Blends and Synthetic Blends".

Piedmont Section Annual Report

THE annual report of the Piedmont Section, as submitted by M M McCann, acting secretary, follows:

MEETINGS

February 3, 1951 —— Poinsett Hotel, Greenville, S C. Technical Session 3:00-5:00 PM. First paper: "Polyphosphates in Textile Processing" by Arthur H Razee, Mgr of Chemical Sales and Service, Rumford Chemical Works, Rumford, R I. Second paper: "The PPG-IDL Color Eye" by Dr George F Bentley, Pres, Industrial Development Laboratories Inc, New York City. Banquet Speaker: Rev Oran C Zaebst, Christ Church, Greenville, S C "The Hobby of 80,000 American people." Attendance 250.

April 21, 1951——Sir Walter Raleigh Hotel, Raleigh, N C. Members of National Council and Research committees also met at the hotel on Thursday and on Friday at the School of Textiles, North Carolina State College. Technical session Saturday at 3:00 PM was presentation of Student Contest papers from North Carolina State, Georgia Tech and Clemson. Winning paper was entitled "Textile Applications of Infra-red Photography" by C Franklin Donyes, student at N C State College. W E Debnam, noted radio commentator, speaker and author was guest speaker at banquet with over 200 attending.

June 29 and 30th, 1951——The annual Summer Outing was held at the Ocean Forest Hotel, Myrtle Beach, S C. Two hundred and eighty members and wives were in attendance to enjoy the friendship and good will of this annual occasion.

Sept 22, 1951——The annual business meeting was held at Hotel Charlotte, Charlotte, N C. Technical session 3:00 PM. Speaker: Dr G S Turnbull, Dyestuff Division, DuPont Co. Subject: "Dyeing of the Newer Synthetic Fibers". Followed by discussion period led by Dr H Y Jennings, Dan River Mills. Banquet Speaker: Vice President Geo O Linberg, who presented appropriately inscribed scrolls to all past chairmen of the Piedmont Section. 210 members and guests attended banquet. At the conclusion of the banquet chairman Edwin Briggs, presiding, turned over the business of the section to new officers listed below:

Chairman—Hobart Souther
Vice chairman—J C Whitt
Secretary—M M McCann
Treasurer—Herman J Jordan
Councilor—Joseph Lindsay
Custodian—Arthur Thompson
Sectional Committee—John S Beattie, Wilford Sargent, Clarence Hooper, Russell G Lawrence.
Student Contest Committee—Robert H Smith, *chairman*, D A Torrence, C O Stevenson.

MEMBERSHIP FOR 1951

Category	*Beginning of year*	*Closing of year*	*Gain or Loss*
Senior	546	576	+30
Associate	70	82	+12
Junior	72	90	+18
Student	13	10	— 3
Corporate	30	32	+ 2
Totals	731	790	+59

Midwest Section——

MODERN USE OF VAT DYES IN THE TEXTILE INDUSTRY*

S J LUSCIAN

Calco Chemical Division, American Cyanamid Company

The uses of vat dyes in the present golden age of vat dyeing are briefly discussed by the author. He begins with the application of anthraquinone vat dyes to wool, for which it is claimed that they do not impair hand or tensile strength in light and medium shades more than chrome dyes. Anthraquinone vats for wool have the advantages of better fastness to light and better fastness to washing for some bright shades than attainable with chrome colors. Other factors, such as relative costs of chemicals, dyes, and labor for vats and chrome on wool, are considered.

The Standfast molten-metal and the Williams hot-oil continuous methods for the application of both vat and sulfur dyes to cotton and rayon are described.

INTRODUCTION

So much progress has been made in recent years in vat-dyestuff application that it might fairly be said that we are passing through its golden age. Many of these advancements are in the equipment field, while others are evident in the development of new and improved dyeing techniques. As time will not permit a thorough discussion and evaluation of all of these recent developments, this paper will be restricted to an examination of a few of the more important ones.

DYEING WOOL WITH VAT COLORS

The application of vat dyes to wool is not entirely new, but, until very recently, their use has been limited to indigoid and thioindigoid types. The process consists of reducing the color with a small amount of caustic soda and sodium hydrosulfite and then dyeing in a reducing bath made alkaline with ammonia. Except for the dyeing of indigo, they never became popular because the line is limited, the range is not complete, and the light fastness of some of its members is only fair. The anthraquinone vats so widely used on cellulosic materials because of their excellent fastness characteristics were never seriously considered since the amount of caustic soda required to maintain leuco solubility during dyeing was regarded as too destructive to wool. Under carefully controlled conditions, however, the application of vat colors to wool causes no more damage to the wool fiber than do chrome colors. If the dyeings are restricted to light and medium shades, the yarn has as high a tensile strength and as good a hand as corresponding shades dyed with chrome colors. That statement is based not on laboratory dyeings but on many thousands of pounds of wool slubbing and stock dyed in various woolen mills in the East.

The use of vats for light and medium shades is advocated only when the ordinary acid and chrome colors are unsatisfactory because of poor fastness to light, washing, or fulling, or because they may not be bright enough. There is room for improvement in the field of automotive and upholstery fabrics, rugs, bathing suits and yarn for knit goods. Very recently further impetus has been given to the consideration of vat colors on wool because of the Quartermaster's requirements for fabrics to meet certain specifications not possible with the ordinary acid and chrome colors. The depth of this shade, coupled with the limitations on the dyes which will conform to these specifications, presents a little more difficult problem.

FASTNESS PROPERTIES——As a class, the vat colors possess excellent light fastness on wool, and it is surprising how fast they are even in light shades. In many cases there is a slight initial fade, but no further serious fading even on prolonged exposure. In speaking of the light fastness ratings of such colors it is necessary to consider the source of the light used for fading. It is well known that the Fade-Ometer is not always a reliable instrument for measuring the light fastness of wool dyeings. When light shades are exposed, especially blues and pinks, an apparent fading takes place in a few hours, but it is generally due to a yellowing of the wool fiber under the heat and light of the Fade-Ometer. This can easily be shown by exposing undyed wool simultaneously with the dyed samples. Weather exposures give a more reliable indication of the true light fastness, but these too must be accepted with discretion. Dust and dirt settling on the exposed samples tend to cover or mask the true shade, and light and pastel shades appear to be faded. In such cases sunlight exposures under glass should be made. Other outstanding properties of vat colors are fastness to perspiration, washing, fulling, and peroxide bleaching and the ability to dye level on all types of wool.

DYEING COSTS OF VATS ON WOOL——The matter of dyeing costs is another question often raised when vat colors are being considered. Because they have lower tinctorial power than acid and chrome colors, their dyeing costs are bound to be higher. There is a considerable saving in steam, however, as there are no prolonged dyeing periods at high temperatures. The highest temperature reached during the dyeing cycle is 110°F, and any aftertreatments that may be necessary are carried out at 140°F or less, and then only for short periods of time. The chemical costs for dyeing all light and medium shades average $0.02 per pound of wool and the cost of dyestuff to produce a baby pink or a baby blue varies from $0.01 to $0.02 per pound. The figures for dyestuff for most light to medium shades will vary from $0.02 to $0.10 per pound of wool. Based on the present price of wool these costs are certainly not prohibitive if a dyed fabric can be produced with fastness qualities not obtainable with the ordinary wool colors.

The time element for dyeing wool with vat colors is another factor to be considered. All shades can be dyed within a three-hour period and many of them may be completed in 2½ hours. This of course includes loading and unloading as well as any pretreatments or aftertreatments that may be necessary.

FACTORS TO BE CONSIDERED IN DYEING——Before going into the actual dyeing procedure it would be well to point out some of the important factors that are necessary to produce good level dyeings and a final product that compares favorably with wool dyed with the ordinary acid or chrome colors. These factors concern the processing of wool in stock or slubbing form as it is in this form that most of the work has been done

* Presented before the Midwest Section on May 5, 1951.

up to this time. We have had very successful results, however, with the dyeing of wool yarn in package form, and we have reason to believe that light and pastel shades can be dyed on piece goods continously in special equipment.

In the dyeing of stock and slubbing, best results are obtained in equipment in which the material remains relatively stationary and the dye solution is circulated. The reason for this, of course, is to prevent any felting of the woolen fibers. The use of stainless-steel equipment is preferred since it is unaffected by alkaline solutions, but many thousands of pounds of wool have been dyed in wooden kettles. Brass and copper should be avoided as much as possible, not only in the kettle or kier but also in fittings, piping, and expansion tanks. Pumps and impellers should be strong enough to insure continued circulation even after the stock has been swelled by the effect of the alkaline dyebath. Pressure gauges give some idea of liquor flow and thermometers are useful in maintaining accurate control. Drains and supply lines should be large enough to perform their functions efficiently and in the shortest possible time.

In loading a top dyeing kettle it is necessary to put on one or two less tops per spindle than usual in order to allow for expansion when the fiber swells. Since vat colors do not migrate or diffuse as readily as acid and chrome colors on wool, it is important that raw stock be packed uniformly to prevent channeling and uneven dyeing. Overloading should be avoided for the reason mentioned above, and part loads are unwise since they do not permit the proper balance of alkali in relation to the amount of wool. Liquor ratios above 15 to 1 are also not practical for cost reasons as color exhaustion is retarded and dyeing time is increased. Coverings for tops or Abbott spools should be of nylon, especially for dyeing light shades, to insure that most of the color is exhausted by the wool and is not taken up by the covering.

It is possible to use any vat color in dyeing wool, but, as with other classes of colors, the proper selection depends upon the specific end use of the dyed material. The best dispersed types of finest particle size are recommended, especially in the pigment method of dyeing. Except for a few special colors that require a high temperature and a concentrated vat for reduction, the pigment method gives results equally as good as the reduced method. Contrary to popular belief, most vat dyes will reduce and solubilize satisfactorily in a low-temperature, low-concentration bath of caustic soda and hydrosulfite, and the time required for reduction is only a few minutes longer. Besides being a much simpler procedure, the pigment method eliminates the necessity of feeding the color slowly or in several portions to insure level dyeing.

BASIC PROCEDURES——Before outlining a typical dyeing formula, let us consider the basic procedures which are applicable to wool in either stock or slubbing form and on the various types of equipment. Preparation of the stock before dyeing is relatively simple. Slubbing may be wet out with a little synthetic wetting agent or detergent, or it may be added directly to the dyebath. Oily or dirty stock should be given a mild scour at 120°F with a detergent, and the liquor dropped before the make-up of the dyebath. For dyeing by the pigment method the dyebath is made up at 90°F, and the buffer, if it is going to be used, is added at this point. This buffer may be left out with concentrations of caustic below 0.5 oz/gal and for temperature below 120°F, but at these figures and above it has been determined that a buffer does have a protective action upon the fiber. Sodium ligninsulfonate or a lime-free animal glue is used for this purpose, but the former is preferred because it is easy to dissolve and it is cheaper. In either case 0.25 oz/gal is all that is necessary.

The vat dye in dispersed form is now added all at once; slow feeding is unnecessary because it has very little affinity in this form. The dye is followed by the required amount of caustic soda, which must be added slowly and in dilute solution while the dyebath is in circulation. Light shades can be dyed with from 0.25 to 0.4 oz/ gal of caustic soda, but darker shades require from 0.5 to 0.75 oz/gal.

When the alkali is uniformly distributed, sodium hydrosulfite is sprinkled into the expansion tank or mixing compartment. Three quarters as much hydrosulfite as caustic is sufficient to start with, but prolonged dyeing cycles or excessive agitation of the dyebath may require a further addition to keep the dye in reduction. A simple test with Vat Yellow G paper will indicate whether sufficient hydro is present.

The temperature is now raised slowly to 110°F, and, after dyeing has gone on at this temperature for a short time, common salt or Glauber's salt is added in several portions to promote better dye absorption. The amount of salt will vary from 1.0 to 4.0 oz/gal according to the depth of shade and the dyestuffs. Light shades may be rinsed at this point, but, with some darker shades, it is sometimes advantageous to reduce the pH with an addition of 0.25 to 1.0 oz/gal of sodium bicarbonate before rinsing.

The rinsing operation is best carried out with running water while the drain is open so as to minimize packing in the case of stock and channeling in tops and Abbott spools. Draining of the dyebath in raw-stock dyeing increases the packing effect, but it can be practised if pump pressures are adequate to overcome this added resistance to the flow. If the rinsing water is very cold, the chill should be taken from it by injecting steam into the water line. When the effluent liquor is clear and cool and the pH has dropped below 9, the material is oxidized with 1 to 2% of sodium perborate or hydrogen peroxide at 90°F. After oxidation has proceeded for several minutes, acetic acid is added and the temperature is raised to 120° F. This completes the development of the shade and neutralizes any remaining traces of alkali.

Aftertreatment with a synthetic detergent may be omitted for light shades or for slubbing that is to be backwashed. Darker shades should be aftertreated to obtain clearer colors and to increase the fastness to washing and fulling. If a nonionic type of detergent is used, it may be added directly to the oxidizing bath. The material may be given a final rinse, but this is often omitted if the aftertreating liquor is clear.

In the reduced method of dyeing the color is prepared by reducing it for 10 minutes in a concentrated stock vat with 2 to 4 oz/gal of caustic and hydro at the temperature recommended for the dye or dyes being used. The dyebath is made up as in the pigment method, the amount of caustic and hydro required to reduce the dyestuff being deducted from the amount for the bath. The stock vat is added to the dyebath slowly, and preferably in several portions, especially in the dyeing of light shades. From this point the procedure is the same for the pigment method.

TYPICAL DYEING PROCEDURE——As an example, here is an outline of a typical procedure for dying wool slubbing in a Longclose type of kettle:

GREY SHADE: Pigment Method.
MATERIAL: Wool slubbing in top form, 300 lb.
DYEBATH: Wetting agent, 0.10 oz/gal or 3 lb 6 oz. Caustic soda, 0.40 oz/gal, or 13 lb 8 oz. Sodium hydrosulfite, 0.40 oz/gal, or 13 lb 8 oz. 540 gal water at 90°F, ratio 15 to 1.
DYE FORMULA: 3.0% Calcosol Gray 2G Double Paste, 9.0 lb. 3.0% Calcosol Violet BN Extra Paste, 9.0 lb. Disperse with hot water.
DYEING PROCEDURE: Add to dyebath the wetting agent and dye disprsion and circulate 5 minutes.
Add caustic soda in solution, slowly, and circulate until uniformly distributed (about 5 minutes).
Sprinkle in dry sodium hydrosulfite, and circulate 10 minutes.
Raise tmperature slowly to 120°F and run 10 minutes.
Add 1.0 oz/gal common salt and run 15 minutes.
Add same amount of salt and run 15 minutes longer.
Turn on cold water with the drain open and rinse until the pH is 9 or lower.
OXIDATION: Add 2% Hydrogen peroxide (100-volume). 2% Acetic acid (56%). Heat to 120°F and run 10 minutes.
AFTERTREATMENT: Either in the same bath or in a fresh bath add 1% synthetic detergent (nonionic type).

Heat to 140°F and run 10 minutes.
Drain and rinse warm.
The aftertreatment and final rinse may be omitted and the tops sent directly to the backwasher.

The procedure just outlined is essentially the same for dyeing tops on Abbott spools, or stock in kettles and kiers. Woolen yarn may be dyed in package form by itself or in blends with cotton or viscose. In dyeing wool and viscose combinations it is essential to choose colors that produce a good union between the two fibers to avoid a heathery effect. Experiments are in progress on the continuous dyeing of light shades of vat colors on woolen piece goods in the open width, and our results indicate that it can be done on equipment in which the fabric is processed under reduced tension.

MOLTEN-METAL DYEING PROCESS

Another recent development, which has excited considerable interest in the vat-dyeing field, is the process of passing fabrics through a bath of molten metal for the purpose of developing or fixing the color. Up to now this idea has been used mainly for the application of vat colors to cellulosic materials, but it may also be used for sulfur colors.

Some of the numerous disadvantages of the present systems of dyeing vat colors continuously are the following:

1) The use of padders, which, unless they are kept in perfect condition at all times, result in side-to-center shading, a back-to-face difference or some other form of uneven impregnation. The cost of maintenance can also be very high.

2) The leuco instability of certain vat dyes at high temperatures in a liquid phase makes their use difficult or even impossible.

3) Shade control is often quite a problem because of the varying exhaust rates of vat colors. The pad-steam system has more or less solved this, but it must be taken into consideration when liquid baths are used for development.

4) Waste of dye liquors which are left over in padder boxes or developing baths, and in overflows which help to facilitate shade control.

5) The time and expense involved in developing a starting formula and cleaning between shades.

6) Limitations of present continuous dyeing systems to yardages of 5,000 or more for economic reasons.

The Standfast molten-metal machine is claimed to overcome all of these difficulties and, according to those who have seen it in operation in England, Standfast has achieved a considerable measure of success. It is essentially a two-unit range, a dye impregnation trough placed over a molten metal development bath, and a series of boxes for rinsing, oxidizing, and soaping as in other continuous ranges. For some heavyweight fabrics or fabrics made up of hard-twisted yarns it may be necessary to pigment pad and dry first in order to obtain satisfactory penetration.

The molten metal is contained in a U tube, 5 feet deep, 5 feet wide and 1 inch thick, and uniform temperatures are maintained by a series of steam pipes arranged on both sides of the U. A roller at the bottom facilitates the passage of the cloth through the metal. The metals employed are a combination of bismuth, lead, tin, and cadmium, and have a melting point around 158°F. Wood's or Rose's alloy may also be used. Normal operating temperature for the metal is around 205°F, but it may be somewhat higher or lower. The weight of the metal required to fill the U tube is about 3500 lb, its density is 9.0, and its cost at present prices is around $6000. With daily operation it is claimed that the metal has a life of over three years. The loss of metal on the cloth, mostly at the seams, represents a cost of about 1/10 of a cent per yard of cloth processed.

The surface of the molten-metal bath is enlarged to form one single bath, and directly over one leg of the U tube is fastened a narrow trough or reservoir to hold the dyebath in reduced dyeing, or the chemical bath for pigment-padded cloth. Part of this trough extends below the surface of the metal so that, when it is filled, there are 2 inches of liquor below the surface of the metal and 8 inches above. This trough is 5 feet wide, 1 inch thick, and holds one gallon of liquor.

The dye liquor is prepared cold in the supply tank with the necessary amount of caustic soda and hydrosulfite and any wetting or dispersing agent that may be required. This low temperature results in a saving of hydrosulfite since the liquor is much more stable cold. Before passing into the trough the dye liquor goes through a preheater where the temperature is raised to about 165°F. This method permits the use of the anthraquinone blues since there is no storing of large amounts of dye liquor at a high temperature for any length of time. Temperatures and the feeding of dye liquors are automatically controlled.

The dry cloth is heated before entering the dyebath to insure uniform absorption of liquor, passes through the molten metal and emerges from the far leg of the U tube through another trough containing a rinsing solution of Glauber's salt. The pressure of 20 lb per sq inch at the bottom of the tube leaves a dye-liquor pickup of 140% in the goods. From the salt rinse the cloth may be oxidized, soaped, and rinsed as usual in a multicompartment range.

The advantages of the molten metal over a set of rubber squeeze rolls are obvious. The squeezing effect is bound to be uniform because equal pressure is exerted from all sides. Variations in fabric surface or fabric thickness offer no problem since the metal conforms to the surface of the cloth and pressures are uniform at all points. Thus, thick and thin areas are more likely to dye the same shade than if they were padded. Oxidation problems encountered in the older methods of dyeing are eliminated because of the fact that air is completely excluded in the passage of the cloth through the metal bath.

All vat dyes, regardless of class or grouping, may be employed, and no variations in the amount of caustic and hydro are necessary. It is important that the finest dispersed-dye types are used as reduction and fixation of color must take place in a matter of seconds. It is the short liquor ratio combined with the rapid transfer of heat from the metal that makes this possible. Since more rapid migration and diffusion of color take place at elevated temperatures, better penetration of dye can be expected.

The machine may be operated at speeds varying from 30 to 120 yards per minute according to the fabric being processed. Differences in speed do not influence the shade as long as there is sufficient time in the metal for reduction and fixation. At 120 yd/min there is a 1.67-second immersion, while at 30 yd/min the time is 6.7 seconds. Another feature of this machine is that it permits the operator to match new shades in a laboratory model and to duplicate these results in the plant without a change in the formula. This makes it possible to match any number of shades in advance, prapare a second shade in an auxiliary tank while one shade is being run, or check a tank of dye liquor in case of an error by the drug-room clerk. These checks can be made in a matter of minutes with very little loss of time. Changing from a dark to a light shade takes no more than five minutes since it is only necessary to drain the liquor from the dye trough and to flush it out with a solution of caustic and hydro in order to be ready for the next shade.

It is claimed that practically any weight or construction of fabric may be handled, including such materials as towels, cotton velvets, and drapery fabrics. Even blends of cotton and viscose present no problem. Navies and dark greens have been dyed by the reduced method with excellent penetration and levelness. In addition to the advantages already mentioned, another and probably the most important is the fact that small runs of less than a thousand yards can be processed economically. The best proof that the whole idea is sound comes from the many orders for the machine that have swamped the manufacturers.

HOT-OIL PROCESS

Another more recent idea, closely paralleling that of the molten-metal machine, is the hot-oil dyeing process using standard Williams units. In this method the medium employed for developing the vat or sulfur color is a hot bath of a white mineral oil. For economic reasons this oil may soon be replaced by a cheaper grade of oil, which is expected to give equally good results.

Two units are recommended for this process, one to be used as a chemical padder and the second to contain the oil for developing and fixing. Additional units may be added for the purpose of rinsing, oxidizing, and soaping, but the conventional wash-box type of range will serve the purpose.

The fabrics are first pigment padded and dried in the usual way, passed through one unit containing a cold solution of caustic soda and hydrosulfite plus an addition of pigment pad liquor, and then into a second unit containing the hot mineral oil at a temperature of 215 to 250°F. The second unit is only half filled because of the foaming that takes place when the moisture in the cloth comes in contact with the hot oil. The fabric is still moist on leaving the oil bath and any oil carried through on the cloth is removed by passage of the cloth through a cold concentrated solution of a synthetic detergent. When sulfur colors are processed on this machine, the cloth is padded in the usual manner with a hot sodium-sulfide solution of the dye and then passed directly into the hot-oil bath in a Williams' unit. The oil bath need not be changed between shades since it does not become contaminated, but a fresh chemical bath must be made each time. The loss of oil which is carried through by the cloth averages one gallon for 300 yards of a 4.00-yard fabric. Vats and sulfurs are both processed through the oil at a temperature of 215 to 250°F, higher temperatures permitting speeds up to 120 yards per minute. At the operating speeds of 60-80 yards/minute the time of passage through the oil is from 10-12 seconds.

The advantages claimed for this process are as follows:

1) A wider variety of cotton and spun-rayon fabrics can be handled.

2) There is practically no limit on the depth of shade that can be processed, especially on rayon.

3) Dyes sensitive to high temperatures may be used.

4) A dyestuff saving of up to 25% with vat colors and up to 40% with sulfurs. A saving in chemicals is also claimed.

5) More uniformity of shade from end to end and side to center.

6) Laboratory matches are more easily duplicated.

It is assumed that these reported advantages are over the conventional method of dyeing on Williams' units. As in the case of the molten-metal process, however, a complete evaluation of the hot-oil method must await the test of time.

OTHER VAT-DYEING DEVELOPMENTS

Before closing let me mention briefly a few other recent developments in the field of vat-color application. One of these is the Batchelder machine, which is designed to dye cotton warps from section beams and to deliver them in the form of loom beams ready for weaving. The warps are handled in sheet form on a machine consisting of a 2-roll padder for pigmenting, a set of high-pressure drying cans, a 2-roll chemical padder, a steamer for developing the shade, an 8-box washer, another set of drying cans, a slasher, a few more drying cans, and a warper to deliver the yarn as a loom beam. This range, which combines dyeing and slashing in one operation, bids fair to render obsolete present methods of dyeing ball and long-chain warps.

In the package-dyeing field methods have been developed for improving penetration and eliminating crossovers in the running of hard-twisted yarns. Higher temperatures are resorted to and sodium nitrite may be used to stabilize the dyebath and to prevent the decomposition of anthraquinone blues. High-pressure dyeing at 250°F is another idea which is being given serious consideration, and one package-machine manufacturer is now building equipment for this purpose. It is said to shorten the dyeing time and to give excellent penetration and levelness.

The continuous dyeing of stock and staple fibers may soon be possible on a greater scale than heretofore. A piece of equipment was recently designed, which consists of a series of endless-chain belts, on which the material is fed and which carry the stock through a succession of baths for dyeing, rinsing, developing, etc, with suitable squeezing facilities between each. Although this machine is still in the development stage, it is expected that means will be found to use it for dyeing various classes of colors and practically all of the fibers that we know of today.

These are only a few of the developments of the last ten years, but they leave no doubt in our minds of the tremendous progress that has been made in vat-color application. Though all of his problems may not be solved, the vat dyer of today is grateful for the new tools and techniques that are available to him and the headaches that have been cured. Some problems still exist, however, and new ones are bound to arise with the new developments of the future.

Mid-West Section Fall Meeting Report

September 29, 1951
Morrison Hotel, Chicago, Ill

THE fall meeting of the Mid-West Section was held at the Morrison Hotel, Chicago, Illinois, on September 29, 1951.

The afternoon session, which attracted approximately 130 members and guests, was called to order at 2:45 by the Vice-chairman. After a few preliminary announcements, he turned the meeting over to Alexander P Roy, director of research and superintendent of dyeing, Dean & Sherk Company, Lawrenceburg, Ky. Mr Roy, assisted by Harold N Knight, master dyer of the Dean & Sherk Co, presented "A Discussion Concerning Developments on New Fibers". A considerable number of dyeing samples were exhibited in conjunction with the talk.

Following dinner at 7:30, the evening meeting was called to order by Chairman Morrill, with 124 members and guests in attendance. S Klein, Chairman of the Nominating Committee, announced the following nominations for Section offices for the coming year:

Chairman	Alfred J Olson
Vice-chairman	John G Stott
Treasurer	Kirk P Ferguson
Secretary	Victor H Lawrence
Councilors	Joseph H Jones
	Elliott Morrill
Sectional Committee	Leonard J Armstrong
	Kenneth J Giese
	Peter Meeuwsen
	John Nerl

A motion was made and approved that the Secretary cast a unanimous ballot for the candidates.

The retiring Chairman then introduced the new Chairman and speaker for the evening, Alfred J Olson, who is superintendent of dyeing, Phoenix Hosiery Company, Milwaukee, Wisc. After a few introductory remarks, Mr Olson spoke on "New Synthetic Fibers in the Hosiery Field". Along with the discussion from the floor, Mr Olson displayed samples of hosiery manufactured from the fibers he discussed.

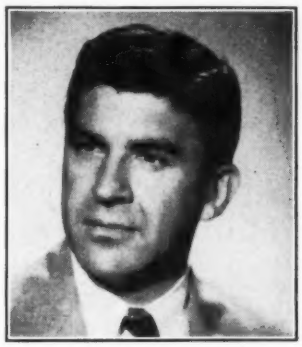
Respectfully submitted,
JOHN E A SCHRODER,
Secretary

Mid-West Section——

COLOR STRIPPING WITH REDUCING AGENTS*

J M SCHANDLER

Rohm & Haas Company



The stripping of dyeings with reducing agents derived from hydrosulfite is discussed by the author under the headings of stripping agents, reasons for stripping, choice of stripping agent and stripping procedures for different fibers. The importance of preliminary washing, of pH control, of temperature and of the manner of rinsing stripped stock in stipping procedures is emphasized.

The protection of wool fiber from damage in stripping and other wet processing steps by replacement of the sulfur linkages in the cystine portion of wool by ethylene groups according to the Harris invention is briefly described.

INTRODUCTION

THE stripping of colors from textile fibers is a constructive operation in that it permits reutilization of certain fibers after a garment is discarded, and it is also a method for correcting inadvertent errors in dyeing. Because of its universal use wherever dyeing is carried out, the dyer should be thoroughly familiar with the various aspects of this operation, such as the proper stripping agents for the desired result and the optimum conditions under which these agents may be applied. Our talk today will be concerned with reducing agents for stripping and will include hydrosulfites and formaldehydesulfoxylates.

COMMON STRIPPING PROCEDURES

STRIPPING AGENTS —— Before proceeding further with the details of the stripping operation, let us first examine the tools that we have at hand. There are five materials which we plan to discuss:

1. Sodium hydrosulfite
2. Zinc hydrosulfite
3. Sodium formaldehydesulfoxylate
4. Normal zinc formaldehydesulfoxylate
5. Basic zinc formaldehydesulfoxylate

Sodium hydrosulfite is commonly known as the "workhorse of the dyehouse". Its largest use is in vat dyeing, where it converts an insoluble vat dyestuff to the alkali-soluble leuco form, which possesses substantivity for most natural and some synthetic fibers. In stripping, sodium hydrosulfite is normally used in an alkaline bath at a pH of 7.5 to 11 and at temperatures of 140 to 160°F. This material is readily soluble in water and may be added directly to the bath containing the stock without first being dissolved separately. Because of the high pH at which this material is normally used, it is employed for stripping cotton and rayon.

Zinc hydrosulfite, a brother to the better-known sodium hydrosulfite, differs in use in that it is applied in a slightly acid bath, that is, at a pH of 5.5 to 7.0. Stripping with this material is carried out at temperatures of 160 to 180°F. It may be used on cotton, rayon, acetate, wool, and silk.

Sodium formaldehydesulfoxylate is used primarily in printing vat colors as well as in discharging dyed grounds for pattern effects. This material exerts no reducing action under conditions of low temperature and alkalinity. Therefore, when this product is used for stripping, it must be under acidic conditions at a pH of 3.2 to 3.5 and at temperatures of 180 to 212°F.

Normal zinc formaldehydesulfoxylate is used for discharging acetate-dyed grounds in printing as well as in stripping. It also exerts no reducing action under conditions of low temperature and high pH and must therefore be used in a manner similar to the sodium salt at a pH of 3.2 to 3.5 and at 180 to 212°F. This material, like the sodium salt, is soluble in water and may be added directly to the bath containing the stock to be stripped.

Basic zinc formaldehydesulfoxylate has only a limited solubility in water of moderate to high pH and should be predissolved in an aqueous acidic solution at a pH of 3.4 to 3.8 prior to addition to the bath. It also must be used at a pH of 3.2 to 3.5 and at temperatures of 180 to 212°F for optimum results.

These materials have been listed in order of their heat stability, sodium hydrosulfite decomposing and exerting its reducing or stripping action at the lowest temperature, followed in order by the other materials. As we have intimated so far, a reducing agent exerts no reducing power under those conditions where it is stable. The reducing or stripping action takes place as the material decomposes, and the conditions must be so controlled as to prolong the decomposition over a reasonable period of time to obtain a thorough and uniform job.

There are, of course, exceptions to the rules given above. For instance, in the degumming of silk, there are times when the sodium formaldehydesulfoxylate is used in the boiling soap solution to remove tints that are not sufficiently fugitive. Here, the conditions of pH are neutral even though the temperature requirements are present. However, as the tints are removed, we see that under some conditions—in this case, colors easily reducible—departures from the ordinary are possible. Another example along the same line is the use of sodium formaldehydesulfoxylate in the boiloff bath of spun rayons for the removal of non-fugitive tints. Here again, the temperature requirements are present, but the bath is normally at a pH of 9.5 to 10.5.

CHOICE OF STRIPPER——It is very difficult, if not impossible, to make absolute recommendations regarding the selection of a reducing agent to remove all the colors from a given fiber. In many instances two dyers will obtain different results from the same stripper on the same fibers dyed with the same colors, and yet each may use a different stripper to obtain the results which he requires. Because this is such a complex field, factors which must be taken into account are as follows:

1. Types of fiber present
2. Type of color and depth of shade to be removed
3. Subsequent shade desired.

It is most important to make small-scale trials based on current knowledge, practice, and recommendations from suppliers before deciding on the reducing agent for your particular requirements.

REASONS FOR STRIPPING——At this point, after our preliminary discussion is completed, we might come to the core of the discussion, "Why do we strip colors which we have previously dyed?" There are several reasons involving many phases of textile processing. One purpose of stripping is to correct faulty dyeing. When we

* Presented before the Midwest Section in Milwaukee on Saturday, May 5, 1951.

say "faulty dyeing," we mean dyeing which is not satisfactory because of the indecision of the customer or because of something a gremlin has done behind the dyer's back. Since this very rarely happens, we will gloss over it quickly. Another purpose is to redye because of seasonal and style changes of shade, most commonly encountered in the hosiery field. A third is the reclaiming of fibers for subsequent reuse. Reducing agents are also employed to clean wooden dye machines after dark colors to permit the dyeing of light shades, to remove identification tints which cannot be simply washed out of the goods, and, in some instances, for a mild bleach either on very fine woolens or after the boiloff of certain sheer goods for lingerie.

One of the major constructive functions of the stripping operation is the recovery of wool for subsequent processing. In the past, approximately 30% of all wool processed into garments in this country was reworked or recovered wool. With the present scarcity and high price of this fiber, the percentage may be even higher. To quote a figure, approximately 190,000,000 lb of reworked wool was used in 1949, and by this time that figure is probably far exceeded. Another important branch of the recovery of fibers is the rag industry. While we have no figures available, it would surprise many of us to know the quantities of wiping rags which are used annually. All of these rags are washed, but the rags that bring premium prices are those that have been stripped of color.

COTTON RAGS——In the rag industry the dyed rags are normally sorted from the undyed according to fibers. The cotton rags are first given a strong alkaline wash, they are then given a strip with sodium hydrosulfite and caustic soda, and, finally, they are either rinsed or given a hypochlorite bleach prior to rinsing.

WOOL——In stripping wool which has been dyed with acid colors, the normal recommendations first call for an alkaline scour. The purpose of this scour is to remove extraneous matter and loose color so as to leave the stripper to act exclusively on the color which remains. It is also suggested that a detergent of the nonionic group, such as Igepal CA or Triton X-100, be included in the scour to emulsify any spinning or finishing oils which may remain in the stock. After the scour the stock is thoroughly rinsed, the bath is adjusted to the proper pH at a temperature of approximately 120°F, and the stripper is added. The temperature is then brought to the boil in approximately 15 to 20 minutes and boiling is continued for 30 to 45 minutes or until the desired shade has been obtained. It is almost as important to select the proper acid as it is to select the proper stripper since the desired bottom color of the stock must be kept in mind. As mineral acids give a different residual shade than organic acids, small-scale trials should be run with either muriatic or sulfuric acid as well as with formic and acetic acids. The stripper recommended is either normal zinc formaldehydesulfoxylate or basic zinc formaldehydesulfoxylate. Where a milder strip is desired, as on very high-grade wool, either sodium formaldehydesulfoxylate or zinc hydrosulfite may be used.

A new patented stripping procedure has recently been developed for removing color from wool without further damaging the fiber. This process claims that, with it, the fiber retains all strength and that the process even protects the fiber from loss of strength during scouring, dyeing and any other process to which the fiber may be subjected. This is done by replacing the sulfur linkages, which are easily destroyed by acid or alkaline treatment, with ethylene linkages, which are much more stable and resistant to all acidic or alkaline treatments. In this process the stock is stripped initially in an alkaline bath containing borax, ethylene dibromide, oleic acid and sodium hydrosulfite. The bath is then dropped, but the stock is not rinsed, and stripping is continued with the appropriate reducing agent. If zinc hydrosulfite is used in this second bath, no pH adjustment is required. If sodium hydrosulfite is used, additional borax is added to supply the alkalinity, or, if the formaldehydesulfoxylate types are used, the pH is adjusted with acid prior to addition of reducing agent. This patented process carries a service with it by which the licensor makes the preliminary stripping trials so that the proper reducing agent and acid are specifically recommended. Because of the protection to the fiber obtained through the rebonding step, it is claimed that it is possible to employ more drastic conditions of stripping without damage, and thus to obtain better color removal.

HOSIERY——Color removal and redyeing because of seasonal or style changes are particularly common in the hosiery industry, where the changeover of shades is a seasonal occurrence. In the event that shades of varying depths are to be stripped and redyed in the same bath, a thorough scour with an alkali and a leveling agent is recommended for ½ to 1 hour at as high a temperature as the hose will stand. This scour will assist materially in removing the finish and will tend to level the shades so that more uniform grounds will be obtained for the subsequent dyeing operations. In the case of nylon the scoured and rinsed stock is stripped with normal zinc formaldehydesulfoxylate in a bath adjusted to the proper pH with acetic acid. Here again the depth of shade and the colors involved determine the length of the process. For light shades one strip is probably sufficient. For darker shades a double strip is often required, particularly to reduce blue and yellow dyestuffs to a suitable ground. On some shades a double strip is required, and this must be followed by a treatment with sodium chlorite. In the stripping of cotton or rayon hose, the reducing agent normally used is sodium hydrosulfite at the proper pH and temperature. In the case of silk hosiery, zinc hydrosulfite is recommended.

COTTON AND RAYON——On cottons or rayons dyed with direct or developed colors, in the event that some one other than the dyer makes an error and the shade comes up improperly, the normal correction is obtained with sodium hydrosulfite and caustic soda.

BLENDS——On spun rayon and either wool or acetate blends, one strip with normal zinc formaldehydesulfoxylate and an organic acid, such as acetic or formic, normally gives a satisfactory strip for redyeing.

pH CONTROL——A precaution which must be kept in mind with regard to the use of the formaldehydesulfoxylate type of reducing agents is the importance of pH control. If an insufficient amount of acid is used, the stripping operation will require a longer time to proceed to completion. However, this is preferable to the addition of too much acid, because, under conditions of excess acidity, the decomposition of the stripper will proceed at such an accelerated rate that the liquor will turn milky, and very poor color removal will take place. By the same token, if the pH of the bath with sodium hydrosulfite is allowed to drop to 7.5 or below, the decomposition of this reducing agent will also proceed very quickly with poor color removal.

WASHING STRIPPED STOCK——The manner of washing stripped stock is important. If the bath is merely dropped and refilled with fresh water, the large amount of dissolved air in the water may cause some reoxidation of color. In some cases this is limited either by overflowing the bath slowly or by replacing a part of the bath at the time with fresh water.

CONCLUSION

By way of summary and repetition we would like to bring this discussion to a close by again recommending that the goods be as clean and as free of extraneous matter as possible. It is also recommended that small-scale trials be conducted to determine the proper reducing agent as well as the proper acid to use for obtaining the desired results at a given plant.

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Rhode Island Section——

CURE OF UREA-FORMALDEHYDE RESINS WITH ALKALINE CATALYSTS*

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INTRODUCTION

ALMOST important group of chemicals presently being manufactured for the rayon- and cotton-finishing industry comprises those formaldehyde-nitrogen resins that produce dimensional stability and crease resistance. The older and more widely used members of this series of finishing agents are condensation products of urea and formaldehyde or their derivatives. These are now supplied by several chemical manufacturers in two general forms. The cream or paste form consists essentially of a mixture of monomethylol- and dimethylolurea having a formaldehyde-to-urea ratio between 1:1 and 2:1. Being monomeric in nature, resins of this kind are completely diffusible in cellulosic fibers and are particularly useful for producing shrinkage control and crease resistance without stiffening the fabric. The second general form consists of more highly condensed resins having usually a formaldehyde-to-urea ratio above 2:1. Such resins are either partially or completely indiffusible in cellulosic fibers and are used primarily to produce durable stiffness either alone or in combination with the monomeric resins.

When urea-formaldehyde resins are applied to textile fabrics, it is necessary to cure the impregnated cloth in order to convert the soluble resin product into a highly crosslinked, infusible and insoluble state. This conversion of the resin may be carried out simply by prolonged heating at high temperatures, but since the time for complete setting is excessive, a large variety of catalysts have been developed for accelerating the rate of setting or curing. Thus, while it is possible to cure a urea-formaldehyde resin in a rayon fabric by heating for about 2 hours at 300°F, the same degree of curing may be achieved in 2 to 3 minutes at the same temperature, by using an acid catalyst.

D D Gagliardi

The catalysts presently employed in the curing of urea-formaldehyde resins on fabrics are substances that are compatible with an aqueous solution of methylolurea and that develop acidity at the temperature employed in curing. The various types of compounds develop acidity in various ways, which are explained.

The author then shows with extensive data that alkaline substances, the best being sodium bicarbonate, may be used as catalysts to obtain both durable crease-proofing and stabilization. He expresses the hope that sodium bicarbonate will be tried experimentally on a large scale by mills for curing urea-formaldehyde finishes on textiles.

Of the many catalysts that have been suggested or actually been used for curing urea-formaldehyde resins in textiles, by far the largest numbers are acids or acid-yielding substances, which are incorporated in the resin bath prior to impregnation of the fabric. Neither the patent nor the general literature contains very much information about the use of nonacidic catalysts for this purpose. Because of this lack of information, it has been universally assumed that only acidic substances can be used for good resin curing and that alkaline materials are either undesirable or ineffective. It is generally not known, therefore, that certain urea-formaldehyde resins can be effectively cured by the use of alkaline catalysts and that such catalysts may be very desirable for some particular application of resin to fabrics.

In this paper we wish to present some laboratory information concerning the cure of simple methylolurea resins in cotton and viscose rayon fabrics using a variety of alkaline catalysts, under conditions analogous to those used for normal acidic catalysts and for the usual purpose of producing shrinkage control and crease resistance. The ensuing discussion, therefore, will be concerned with a representative monomeric cream-type product containing a mixture of monomethylol- and dimethylolurea.

CATALYSTS

NORMAL ACID CATALYSIS —— Theoretically, any acidic substance should be applicable for curing urea-formaldehyde resins. In practice, however, it is found that only a limited number of compounds may be used because of the limitations of the resins themselves in regard to bath stability. As a result of the natural instability of methylolureas in the presence of acids, those catalysts which have been found to be useful in practice are the compounds generally labeled "latent acid catalysts", which are essentially neutral when first dissolved in a resin bath but liberate acids when the resin is being cured at a high temperature.

Table I contains an outline of five main types of catalysts, which have been used or suggested for curing urea-formaldehyde resins. The straight mineral and organic acids of Type I have only limited applications since they yield very unstable baths. By choosing a particular combination of acid and buffers, or mixtures of acids, it is possible to use some straight acids successfully. In Europe, for example, the combination of boric and tartaric acids has been widely used in commercial crease-proof finishing with urea-formaldehyde resins in spite of limited bath stability.

The metal salts of weak bases and strong acids (Type II) have been used in the past as catalysts, especially in Germany. Since such salts also liberate acids im-

* Presented before the Rhode Island Section on March 30, 1951.

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TABLE I

MODE OF ACTION OF ACID AND LATENT-ACID CATALYSTS IN CURING UREA-FORMALDEHYDE RESINS IN TEXTILES

Catalyst Type	*Mode of Action*	*Typical Reactions Involved*
I Mineral and Organic Acids	Direct ionization of acid in water	a) $HCl \rightarrow H^+ + Cl^-$ b) $H_2C_2O_4 \rightleftarrows 2H^+ + C_2O_4^-$
II Metal Salts	Hydrolysis of a salt of a weak base and a strong acid	a) $CuCl_2 + 2H_2O \rightleftarrows Cu(OH)_2 + 2H^+ + 2Cl^-$ b) $AlCl_3 + 3H_2O \rightleftarrows Al(OH)_3 + 3H^+ + 3Cl^-$
III Amine Salts	Hydrolysis of the salt of a weak base and a strong acid or, for the salt of a strong base, reaction with formaldehyde and hydrolysis	a) $(HOCH_2CH_2)_3N{\cdot}HCl \rightleftarrows (HOCH_2CH_2)_3N + H^+ + Cl^-$ b) $RNH_2{\cdot}HCl + HCHO \rightarrow RN{=}CH_2{\cdot}HCl + H_2O \rightleftarrows RN{=}CH_2 + H^+ + Cl^-$
IV Oxidizing Agents	Reaction with formaldehyde to give formic acid	a) $HCHO + H_2O_2 \rightarrow H_2O + HCOOH \rightleftarrows H^+ + COOH^-$ b) $HCHO + CH_3COOOH \rightarrow CH_3COOH + HCOOH \rightleftarrows H^+ + COOH^-$
V Ammonium Salts	Hydrolysis and/or reaction with formaldehyde	a) $NH_4Cl + H_2O \rightleftarrows NH_4OH + H^+ + Cl^-$ b) $4NH_4Cl + 6HCHO \rightarrow C_6H_{12}N_4 + 4H^+ + 4Cl^- + 6H_2O$

mediately in the resin bath, they yield very poor bath stability. A more recent application of this type of catalyst has come about with the use of color-fixing agents that contain $CuCl_2$. When these agents are dissolved in the same bath with urea-formaldehyde no other catalyst need be added to cure the resin.

The amine hydrochlorides of Type III are very efficient catalysts. To obtain a useful catalyst of this type it is necessary to have an amine whose base strength is high enough to yield a pH of about 7 when made into a hydrochloride but which, at high temperatures and with reaction with formaldehyde, yields a weaker base, so that hydrolysis can occur. Ordinary primary amine salts are not practical for this purpose since they immediately react with formaldehyde in the resin bath and give a drop in pH which makes the bath unstable. Compounds which contain a primary amino group on a tertiary carbon are useful in the form of their hydrochlorides, since these do not react with formaldehyde at room temperature and a high bath pH is maintained. The main limiting factor in the practical use of amine hydrochlorides is the color and odor of the amine which is left in the cured fabric. For example, the azomethines which result from the combination of some amines with formaldehyde, are foul-smelling compounds, and may leave a characteristic odor in the cured cloth, particularly when it is made alkaline during the afterwash.

An unusual type of catalyst, which may be used for urea-formaldehyde resin, is hydrogen peroxide or one of its derivatives, such as peracetic acid (Type IV). Hydrogen peroxide itself cannot truly be called a latent acid catalyst since it cannot yield an acid substance under any circumstances. But when used in aqueous solutions containing free formaldehyde, it oxidizes the formaldehyde to formic acid, which then catalyzes the condensation of the resin in the cloth. At room temperature, hydrogen peroxide produces formic acid only at a slow rate in the resin bath, so that good bath stability is obtained. This catalyst has not been exploited for commercial resin finishing.

The most important latent acid catalysts, which have been employed from the very early days of resin finishing, are the ammonium salts of organic and mineral acids, the more commonly used salt being diammonium phosphate (Type V). These catalysts function by two mechanisms: (1) hydrolysis of the salt to liberate the free acid, and (2) reaction with free formaldehyde in the resin bath to give the free acid. While ammonium salts produce resin baths with an initially high pH, their reaction with the free formaldehyde leads to a continual lowering of the pH with time, until at some point the resin condenses in solution and settles out as a precipitate. Because of this property, such catalysts are better employed in the presence of buffering agents.

The main five classes of acidic catalysts just mentioned contain literally hundreds of individual compounds which could be used to cure urea-formaldehyde resins in textile applications. In practice, however, only a few have found wide acceptance. The more important reasons for using a particular catalyst in an individual plant are the following: efficiency of curing of the resin; sufficient bath stability (up to 8 hours); uniform resin curing; lack of odor in the catalyst itself or in the finished fabric; fast curing at normal operating temperatures; nonyellowing of white fabrics; no change in shade of dyed goods; and no tendering of the fibers in the fabric. While a catalyst may be only a very

TABLE II

STABILIZATION AND CREASEPROOFING OF A RAYON FABRIC IN THE PRESENCE OF ALKALINE AND ACID CATALYSTS*

% Resin Applied	*Catalyst 1% in Solution*	*Warp Shrinkage*** *%*	*Crease Recovery %*
Control—None	None	7.7	49
5	$(NH_4)_2HPO_4$	4.2	51
10	$(NH_4)_2HPO_4$	3.2	65
15	$(NH_4)_2HPO_4$	2.8	73
20	$(NH_4)_2HPO_4$	2.8	79
5	Na_2CO_3	4.1	56
10	Na_2CO_3	1.4	65
15	Na_2CO_3	0.0	73
20	Na_2CO_3	0.0	78

* Cured 10 minutes at 300°F.
** Full cotton wash at 212°F.

TABLE III

MODIFICATION OF FIBER PROPERTIES FROM THE USE OF ALKALINE AND ACID CURING CATALYSTS

*Treatment*****	*Catalyst*	*Fiber Properties** Tensile Strength g/Denier*	*Elongation at Break %*	*Load at 5% Elong g/Denier*	*Elastic Recovery %*
Control—None	None	2.33	16.8	1.14	15
15% Resin	1% $(NH_4)_2HPO_4$	2.54	8.7	1.98	45
15% Resin	1% Na_2CO_3	2.80	7.0	2.24	50

* 150/40 Viscose yarn.
** Cured 10 minutes at 300°F.

minor ingredient in a resin formulation, it is a most important factor in determining how thorough a modification of fabric properties the resin can bring about.

ALKALINE CATALYSIS——With this general introduction as a background, we shall now consider alkaline catalysts. At the very start, we can assume that if an alkaline compound can effect curing of a urea-formaldehyde resin, the types of reactions that can occur in the fibers of either cotton or rayon must be different from those which take place with normal acid catalysts. In the latter case four different reactions can occur, the main one being condensation of the methylolurea into a three-dimensional crosslinked infusible resin (No 1):

1) $NH_2CONH(CH_2OH)_n \xrightarrow[OH^-]{H^+}$ Infusible resin inside the fibers

2) $2\text{Cell-OH} + 2HCHO \xrightarrow{H^+} \text{Cell-O-CH}_2\text{OCH}_2\text{-O-Cell} + H_2O$

3) $\text{Cell-OH} + HOCH_2NHCONH_2 \xrightarrow{H^+} \text{Cell-O-CH}_2NHCONH_2 + H_2O$

4) $2\text{Cell-OH} + HOCH_2NHCONHCH_2OH \xrightarrow{H^+} \text{Cell-O-CH}_2NHCONHCH_2\text{-O-Cell} + 2H_2O$

Three other side reactions, however, also take place under acidic conditions. But since reactions No. 2, 3 and 4 require acid catalysis, we can assume that when an alkaline catalyst is used for curing, only reaction No. 1 of this series is possible. This does not, however, preclude the occurrence of other side reactions that may be catalyzed by alkalies.

The actual effects noted when methylolurea is cured by an alkaline catalyst are shown in Table II. Here, a direct comparison was made of the degree of creaseproofing and stabilization produced by different concentrations of resin, cured with diammonium phosphate and sodium carbonate. It is noted that the alkaline-catalyzed cure produced better shrinkage control and equivalent crease resistance than the normal ammonium salt catalyst at the same resin-concentration levels. This same higher modification found in an alkaline-catalyzed cure is shown in the analysis of fiber properties given in Table III.

At first glance, it would appear that an alkaline catalyst produces higher resin fixation than an acid substance in view of the apparently higher degree of modification, which results in fiber and fabric properties. This conclusion, however, was found to be incorrect. Table IV contains the results of various analyses made on four resin-treated viscose fabrics, in which two acid and two alkaline catalysts were used to cure the resin. Here it was found that the two ammonium salts produced greater resin fixation than did the carbonate catalysts. The important thing to note, however, is that the resin polymer fixed in the fiber by the alkaline catalysts had a higher formaldehyde-to-urea ratio than that given by the ammonium salts! The only possible ways in which a higher formaldehyde-to-urea ratio could result is either by decomposition of some urea to volatile products or by only a partial utilization of the monomethylolurea fraction of the monomer during the heat cure. In any case, it has been established that, although an alkaline catalyst may produce lower resin fixation, the degree of modification of the properties of the textile is generally higher than that produced by ammonium salts.

The influence of increasing amounts of catalysts on degree of resin fixation is shown by the data in Table V. Under identical application conditions, the Na_2CO_3 yielded again less fixed resins than $(NH_4)_2HPO_4$. It should be noted, however, that while the amount of fixed resins produced by Na_2CO_3 progressively increased with increasing concentration of catalyst, in the case of $(NH_4)_2HPO_4$, maximum resin fixation was given by 0.5% catalyst and higher amounts yielded lower fixation. It is generally not realized that an overdose of ammonium-salt catalyst actually gives less curing of a methylolurea resin than small amounts of the same salt. This is brought about by reaction of the methylolurea with ammonium ions leading to the formation of water-soluble products.

That an alkaline catalyst can cure a methylolurea resin under normal conditions of time and temperature is demonstrated by the data in Table VI. Within five minutes time at 300°F, both Na_2CO_3 and $(NH_4)_2HPO_4$ produced maximum curing, while with no added catalyst the resin was still only partially cured after 30 minutes.

SPECIFIC APPLICATION OF ALKALINE CATALYSTS——We have examined a large number of alkaline compounds for curing simple methylolurea resins, some of which are shown in Table VII. The materials which have been found to be most effective from a practical point of view are sodium bicarbonate and quaternary ammonium hydroxides. Normal alkalies, such as NaOH, KOH, $Ba(OH)_2$ etc, while very effective as catalysts, greatly yellow the fabrics and cannot be used with safety. Primary and secondary amines react too readily with formaldehyde in the resin bath and produce only partial curing. Tertiary amines with high boiling points can be used, but again they may cause yellowing under specific conditions.

TABLE IV

ANALYSIS OF ACID- AND ALKALINE-CURED RESIN-TREATED FABRICS*

Catalyst	% Resin Applied	% Resin Fixed	% Formaldehyde	% Nitrogen	Mole Ratio Urea/HCHO
0.5% NH_4Cl	15.0	11.6	5.55	4.01	1:1.29
0.5% $(NH_4)_2HPO_4$	15.0	11.0	5.57	3.98	1:1.30
0.5% Na_2CO_3	15.0	9.8	5.68	3.29	1:1.60
0.5% $NaHCO_3$	15.0	8.3	4.85	3.05	1:1.49

* Cured 10 minutes at 300°F.

TABLE V

INFLUENCE OF CATALYST CONCENTRATION ON DEGREE OF CURE*

% Catalyst Used in Solution	Mg of Resin Applied	Mg of Fixed Resins Found by Analysis
Control—None	550	150
0.3% $(NH_4)_2HPO_4$	550	326
0.5% $(NH_4)_2HPO_4$	550	329
1.0% $(NH_4)_2HPO_4$	550	311
2.0% $(NH_4)_2HPO_4$	550	244
0.3% Na_2CO_3	550	216
0.5% Na_2CO_3	550	262
1.0% Na_2CO_3	550	294
2.0% Na_2CO_3	550	298

* All samples cured 10 minutes at 300°F.

TABLE VI

RATE OF CURE OF UREA-FORMALDEHYDE RESIN IN RAYON FABRIC
(1% Catalyst in Solution)

Time of Cure at 300°F min	Resin Applied mg	Fixed Resin Found by Analysis		
		No Catalyst mg	Na_2CO_3 mg	$(NH_4)_2HPO_4$ mg
0	500	0	0	0
5	500	121	286	306
10	500	145	292	303
15	500	145	297	297
30	500	180	284	306

TABLE VII
ALKALINE CATALYSTS THAT MAY BE USED WITH UREA-FORMALDEHYDE RESINS

Basic Type	*Some Actual Compounds Tested*	*Limitations*
I Organic Amines	Triethanolamine Benzyldimethylamine Dimethylaniline	Primary and secondary amines are inefficient and react with the resin; odor-formation is bad with some
II Quaternary Ammonium Bases	Trimethylbenzylammonium hydroxide Trimethylhydroxyethylammonium hydroxide Tetramethylammonium hydroxide	None known — do not discolor cloth in low concentration
III Carbonates	Sodium bicarbonate Sodium carbonate Guanidine carbonate	$NaHCO_3$ is best. Others discolor cloth
IV Inorganic Hydroxides	Sodium hydroxide Barium hydroxide Potassium hydroxide	Efficient but discolor cloth

TABLE VIII
STABILITY OF RESIN SOLUTIONS WITH CATALYSTS AT 70°F

Resin Solutions %	*Catalysts %*	*Stability in Hours*
15	0.5% NH_4Cl	2
15	0.5% $(NH_4)_2HPO_4$	12
15	0.5% Na_2CO_3	92
15	0.5% $NaHCO_3$	144

The material that produces good curing and a minimum of bad side effects is sodium bicarbonate. This compound behaves essentially as a "latent alkaline catalyst" since it is a mild alkali at room temperature, but is converted to sodium carbonate during the cure:

$$2NaHCO_3 \xrightarrow{\Delta} Na_2CO_3 + H_2O + CO_2$$

No problems of bath stability have been encountered in the use of alkaline catalysts, the resin solutions being generally more stable than those with normal ammonium salts (Table VIII).

The most interesting application we have noted for sodium bicarbonate and some of the other alkaline catalysts is in the application of urea-formaldehyde resins to cotton fabrics for the purpose of producing crease resistance. In this application, alkaline catalysts were found to produce much higher crease resistance than diammonium phosphate at the same resin-concentration levels. This behavior is shown by the data in Table IX. These and previously shown data indicate that, from the use of an alkaline catalyst with a smaller amount of resin, it is possible to obtain the same crease resistance as that given by high concentrations of resin plus acid catalyst. Compare, for example, the effects of 10% resin with 0.5% $(NH_4)_2HPO_4$ with those of 6% resin plus 0.3% Na_2CO_3. This same effect is shown in Tables X and XI on other types of cotton fabrics.

In regard to durability of the effects produced from curing a resin with alkaline catalysts, it has been found that this is not very different from that given by normal acid catalysts. Table XII shows the durability of crease resistance in a cotton fabric treated with resin and $NaHCO_3$. Table XIII contains a comparison of the durability of stabilization given by a urea-formaldehyde resin cured by a variety of catalysts. Here, the alkaline catalysts compare favorably with acidic catalysts and hydrogen peroxide.

ALKALINE CATALYSTS AND OTHER RESINS——In this discussion we have mentioned only simple methylolurea compounds, since these were found to be the most receptive to catalysis with

TABLE IX
ALKALINE CATALYSTS IN CREASEPROOFING COTTON SHEETING

Resin Applied %*	*Catalyst %—Kind*	*Crease Recovery %—W*	*Tear Strength lb—W*	*Tensile Strength lb—W*
Control—None	None	35	4.6	37
6	0.3 $NaHCO_3$	50	2.9	32
8	0.4 $NaHCO_3$	59	2.0	28
10	0.5 $NaHCO_3$	70	1.8	26
6	0.3 Na_2CO_3	59	2.2	30
8	0.4 Na_2CO_3	60	1.8	25
10	0.5 Na_2CO_3	67	1.7	28
6	0.3 $(NH_4)_2HPO_4$	53	2.7	31
8	0.4 $(NH_4)_2HPO_4$	54	2.7	33
10	0.5 $(NH_4)_2HPO_4$	58	2.2	35

* Cured 10 minutes at 300°F.

TABLE X
ALKALINE CATALYSTS IN CREASEPROOFING MERCERIZED GINGHAM

Resin Applied %*	*Catalyst % Kind*	*Crease Recovery %—W*	*Tear Strength lb—W*	*Tensile Strength lb—W*
Control—None	None	34	5.5	43
10	0.5 $NaHCO_3$	66	2.2	36
10	0.5 Na_2CO_3	65	2.3	38
10	0.5 $(NH_4)_2HPO_4$	52	2.7	36

* Cured 10 minutes at 300°F.

TABLE XI
ALKALINE CATALYSTS IN CREASEPROOFING A COTTON CORD FABRIC

% Resin	*Catalyst*	*% Crease Recovery*		*Tear Strength—F*
		W	*F*	
Control	None	47	34	5.1
10	$(NH_4)_2HPO_4$	64	65	2.6
10	$NaHCO_3$	68	74	2.0

* Cured 10 minutes at 300°F.

TABLE XII
DURABILITY OF CREASE RESISTANCE IN ALKALINE-CURED FABRIC
12% Resin + 0.5% Na_2CO_3

Washings No.*	*Crease Recovery %*
0	63
1	65
3	70
5	69

* Modified sanforize washes

TABLE XIII
DURABILITY OF STABILIZATION 15% RESIN ON VISCOSE FABRIC CURED WITH VARIOUS CATALYSTS

Catalyst (0.5%)	*% Warp Shrinkage Number of Washes at 100°F*			
	1	*3*	*5*	*10*
Untreated Fabric	13.1	13.3	13.3	14.4
$(NH_4)_2HPO_4$	3.1	3.6	4.2	3.9
boric acid	4.7	6.4	5.8	4.2
salycylic acid	3.6	3.9	4.4	4.2
succinic acid	3.3	3.3	4.4	4.2
hydrogen peroxide	3.1	3.9	4.4	4.4
sodium bicarbonate	3.6	3.3	4.4	4.7
sodium carbonate	3.1	4.2	4.2	4.2

alkalies. Other formaldehyde-nitrogen resins have been examined, however. In general, it was found that the alkoxymethylurea type of resins could not be properly cured with alkalies. The same was true with certain melamine-formaldehyde resins. Other urea-base resins, which have a formaldehyde-to-urea ratio of from 2 to 5, are only partially or incompletely cured with alkaline catalysts. The behavior of these various resins indicates that a considerable part of their action in cotton and rayon fabrics is due to reactions of the resin (or formaldehyde) with the cellulose. Since such reactions involve the formation of ether linkages, which must be catalyzed by acids, alkaline materials cannot be effectively used.

CONCLUSIONS

Considerable information has now been obtained showing that alkaline catalysts can be successfully used to cure simple methylolurea resins in cotton and rayon fabrics under conditions analogous to those employed for normal acid catalysts. With such catalysts and resins, durable stabilization and creaseproofing may be obtained. The better alkalies which can be used as catalysts are quaternary ammonium bases and carbonates, the best of these being sodium bicarbonate. To our knowledge, alkaline-curing catalysts have not been commercially used because of a general lack of information available on their curing efficiency. We hope that the information herein presented may be useful in stimulating further study of the use of alkaline catalysts for curing urea-formaldehyde resins in textiles.

Annual Report of Secretary Mid-West Section

DURING the year 1951, three regular meetings and an outing were held.

The Winter Meeting was held at the Morrison Hotel, Chicago, Illinois, on February 3, 1951, and was attended by 97 members and guests. The afternoon speaker was WE Winans of the Research Division, Armour and Company, who spoke on "Current Problems of the Packaging Industries". The evening speaker was Colonel Victor C Searle, Commanding Officer of the Chicago Chemical Procurement District, U S Army. Colonel Searle presented a talk on the timely subject of "Military Procurement Today".

On May 5, 1951, as in former years, the Spring Meeting was held in Milwaukee, Wisconsin, at the Hotel Schroeder, and was attended by 80 members and guests. J M Schandler of the Rohm and Haas Company was the speaker at the afternoon technical session. His subject was "Color Stripping with Reducing Agents". S Luscian of the Calco Chemical Division, American Cyanamid Company, spoke in the evening on the subject "Modern Use of Vat Dyes in the Textile Industry".

The Annual Outing was held on June 16, 1951, at Lake Lawn Lodge, Delavan, Wisconsin, and was attended by 145 members and guests.

The Fall Meeting was held at the Morrison Hotel, Chicago, Illinois, on September 29, 1951. (See report elsewhere on these pages).

As of October 1, 1951, the Mid-West Section membership consisted of:

306 Senior members
44 Associate members
14 Junior members
0 Student members
24 Corporate members

The average attendance for the year 1951 was 112.

Respectfully submitted,
JOHN E A SCHRODER
Secretary

COUNCILORS MEET AT CONVENTION

Those in attendance at the 178th Council Meeting, held during the 30th Annual Convention on October 17.

Front row (l to r): Albert E Sampson, assistant treasurer; Harold C Chapin, secretary and Constitution and Bylaws Committee chairman; C Norris Rabold, president; William R Moorhouse, treasurer and Appropriations Committee chairman; J Robert Bonnar, vice president; George O Linberg, vice president, Membership and Local Sections chairman, Corporate Membership chairman.

Second Row: Glenn R Bellamy, South Central; Raymond W Jacoby, Rhode Island; C Russell Gill, Southeastern; Ralph M Fischer, New York; Carl H Brubaker, New York; Leonard S Little, chairman, Executive Committee on Research and chairman, Research Committee; Edward B Bell, Northern New England; Edward J Allard, Rhode Island; Kenneth H Barnard, Conventions Committee chairman.

Back Row: Percival Theel, Publications Committee chairman; Richard B Stehle, Philadelphia; George A Schuler, Publicity Committee chairman; M M McCann, Piedmont; Henry L Young, New York; J Edward Lynn, Western New England; Linton C Reynolds, Piedmont; Joseph Lindsay, Jr, Piedmont; John B Neely, Piedmont; Sumner H Williams, Piedmont; Frederick V Traut, Philadelphia; Robert W Joerger, Rhode Island; Charles K Bishop, Pacific Northwest; Walter F Fancourt, Philadelphia.

Philadelphia Section Meeting Report

October 26, 1951

Kugler's Restaurant, Philadelphia, Pa

A meeting of the Philadelphia Section, held on Friday, October 26th in the English Room of Kugler's Restaurant in Philadelphia attracted 125 to the technical session. 104 members and guests attended the dinner which preceded it.

R. B. Stehle, speaking for the Tellers, announced that, since there was no opposition to candidates suggested by the Nominating Committee, the following were elected officers and councilors for 1952:

Chairman.....Edward C. Diehl
Vice-Chairman.....Harry L. Morgan
Treasurer.....Frederick V. Traut
Secretary.....Thomas J. Scanlon
Sectional Committee....C. T. Anderson, Harry F. Clapham, Albert C. Nuessle and Percival Theel.
Councilors....James Dixon, A. E. Raimo E. E. Rettberg, Jr., Richard B. Stehle, S. Graeme Turnbull, Jr., and Jackson A. Woodruff.

Chairman A. E. Raimo introduced Robert Sullivan, 1935 Section Chairman; Albert De Frank, Chairman of the Chemical Club of Philadelphia; and Isadore Barmish, *Daily News Record* as guests.

Margaret B. Hays, Chairman of the Program Committee introduced the speaker of the evening, Thomas E. Bell, who presented a paper "Peroxide Bleaching of Cotton Yarns and Fabrics." This was followed by a film on the du Pont Continuous Bleaching Range and a question and answer period.

Respectfully submitted,
Thomas H. Hart, *Secretary*

—◆ ◆—

Pacific Southwest Section Outing Report

October 6, 1951

Ojai Valley Inn and Country Club
Ojai, California

THIRTY-FOUR members and guests assembled during the morning of October 6 at the Ojai Valley Inn and Country Club, Ojai, California, for the Third Annual Outing of the Pacific Southwest Section. Following a luncheon served in the patio, the members took advantage of the recreational opportunities offered by the Inn and participated in several contests. A cocktail party preceded dinner.

A very short business meeting was held after dinner. Appointed as members of the Nominating Committee for the election of next year's officers were C F Fieldhouse, Leonard Girling, and John Smith. Mr Fieldhouse, Corporate Membership Chairman, spoke briefly about the use of Corporate Membership dues.

In the golf tournament, the trophy for low gross was won by Robert Mishell, Dye Masters, Inc, with Harry Smith, Standard Dyers and Finishers, receiving the trophy for low net after putting off a tie with Melvin Alpert, Burlington Mills. Robert G Butler, Dyecraft, won first prize in the swimming race; Harry Fieger, L H Butcher Co, was second. Sidney Springer, The Sidney Springer Co, was awarded the ping pong prize. Ball point pocket pens were distributed to each of those present and numerous other prizes were awarded through the drawings.

Thanks are due to Norman Koehler, Outing Chairman, and the local suppliers whose contributions made the many prizes possible.

Respectfully submitted,
JUNE ERICSON, *Secretary*

Membership Applications

SENIOR

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Robert C Squier
John T Walwood

• PATENT DIGEST •

SETTING APPARATUS for NYLON FABRICS G, 3

Brit P 653,455 (Fair Lawn Finishing Company —May 16, 1951)

The setting of nylon is effected mostly by pressing the fabric against a surface that is heated from 190°C to a temperature just 5-25°C below the fusion point of the polyamide during a period not exceeding 60 seconds. These treating conditions are obviously critical; increased temperatures or pressure may cause considerable damage to the fiber's structure.

An apparatus has been constructed for setting nylon fabrics at high speed in a more efficient and economical way and less subject to the operator's control. The web of the fabric to be heat-set is continuously passed while in an extended state through a heating zone at a linear speed of 36-144 yards per minute. A current of gas heated to 400-450°F is continuously directed towards the web, which is exposed for a very short time (1-10 seconds) to the heated stream. The fabric coming from roller (34) is fed over (69) and (70), through slot (2) of the otherwise completely closed housing (3) to roller (1), over (58) to roller (2); it then leaves housing (3) again through slot (22). A cooling roll (32) may preferably be inserted before the fabric is rolled up on (36).

Gas burners (24) are fixed on U-brackets (80, 81) within housing (3). The heated air current is directed by a system of baffles (9, 9a, 10, 10a), ducts (5 and 5a) and nozzles (7 and 7a) against the web, permitting control of the heat treatment according to the structure of the fabric to be treated.

PAUL WENGRAF

STENCIL INK FOR SILK SCREENS——Wax and Polyvinylresin Carrier D, 4

U S Pat 2,556,241 (Du Pont—Van Etten—June 12, 1951)

Polyvinylchloride coated fabrics have to be printed with special stencil inks containing principally polyvinylresins to insure firm adhesion and clean prints. The color must not be tacky, in order to insure a clean break from the pattern when the stencil is removed. Since polyvinylresins have to be applied in organic solvent solutions that evaporate upon drying, the volatility of the solvent is important; rapid evaporation causes clogging of the apertures of the stencil.

According to the present invention, a solution of the resin in appropriate solvent fulfills the requirements of a stencil ink that is to be applied on fabrics coated with polyvinylresins (generally chloride-acetate interpolymers). The copolymer, when mixed at a 1 to 3 ratio with methyl ethyl ketone, dissolves and forms a free flowing liquid, which is further milled with a 20% dispersion of paraffin wax in toluene containing a plasticizer and the pigment. The composition has to be thoroughly ground on a three roll paint mill before use. The consistency of a good stencil ink is described as "short and mayonnaise-like"; under this condition the inks have less tendency to flow around the edges of the squeegee or to leak prematurely through the opening of the screen mesh.

The main application of this process is in the manufacture of vinyl-resin coated tablecloth.

Among other references cited by the Patent Office:

U S Pat 2,391,621 (Carbide & Carbon/1945): paper coating compositions containing vinyl polymer resins blended with waxes.

U S Pat 2,268,595 (Huber Inc/1942): a printing ink containing thermoplastic resins. This ink, solid at room temperature, blends with wax and a pigment.

U S Pat 2,264,625 (Carbide & Carbon/1945): cyclic ketones, e g, isophorone, used as solvents for vinyl resins.

U S Pat 2,254,072 (Pittsburgh Plate Glass/1941): a printing ink containing vinyl- or other thermoplastic resins of powder form. These are suspended in the ink to give a solution of higher viscosity at elevated temperatures by melting of the resins.

U S Pat 2,073,229 (Bakelite Corp/1937): a paper-printing ink compound comprising an oil soluble phenol aldehyde resin and a drying oil.

DRYING APPARATUS—— Heating Drum, Combined with Air Blowing Nozzles G, 3

U S Pat 2,559,412 (Dungler——July 3, 1951)

This device combines the action of a standard drying drum (1) with that of telescopic nozzles (14), which blow air against the material. This arrangement has been described in the author's earlier French Pat 865,315 (see below). The fabric (7) enters the closed chamber (6) encasing drum (1) by a lower slot and leaves through an upper slot to be laid in folds (13). One side of the fabric is dried by the drum and the other by the air blown by fan (15) through an appropriate heating device (16) and through the nozzles (14). The moisture-saturated air is exhausted from (6) by a chimney (not shown).

Among other references cited by the Patent Office:

U S Pat 2,349,558 (Offen/1944): a quick-drying device encased under a hood consisting of frame sections. Nozzles in each section blow dry air on the fabric, which passes over a drying can or drum.

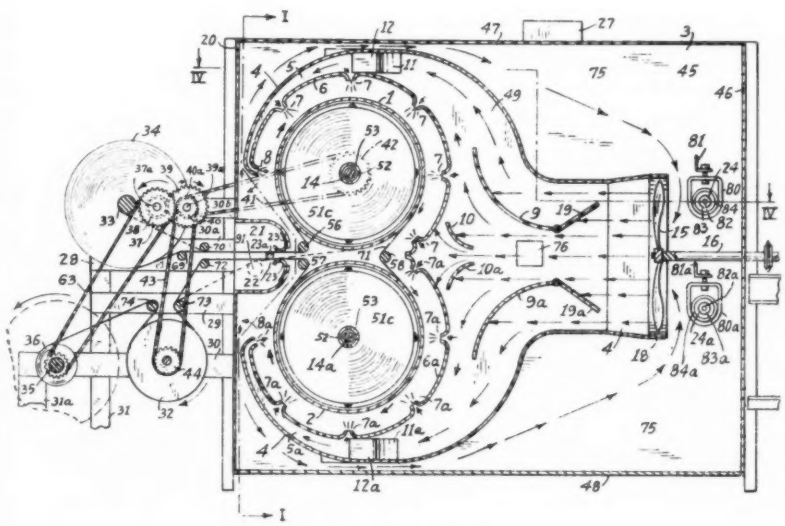
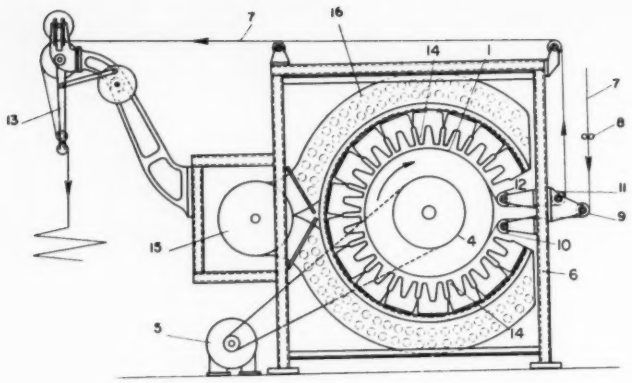


Figure 1—Brit P 653,455



USP 2,559,412

U S Pat 2,301,249 (Samco Holding Corp/1942): a fabric-drying device that continuously moves without appreciable tension and is supported by reels while air is blown through the fabric. Automatic regulating speed control according to the moisture content is provided.

U S Pat 2,252,181 (James Hunter Machine Co/1941): a rotatory tenter drier comprising a large wheel, fitted with circular tenter chains and cylindrical screen to prevent distortion of the fabric. The device is encased in a closed chamber and air is vigorously propelled inwards through the material in radial direction.

U S Pat 2,065,032 (Spooner/1936): a drying machine, especially for paper; drying air or gas is projected against a certain part of the goods covered by a hood and then rejected to increase the drying effect.

French Pat 856,315 (Dungler/1940): a drying device for impregnated fabrics, comprising large pipes that blow hot air onto both sides of the material. The pipes are of adaptable size to cover fabrics of varying width.

Reference is made further to Spooner's Brit P 485,919, in which a drying drum with nozzles blows hot air against the drum. Simultaneous drying of both sides of a fabric by hot air has been described, among others, in Brit P 425,866 (Simons).

STABILIZING CELLULOSIC TEXTILES——Glyoxal, Condensed with Lower Acid Amides G, 2, 04

U S Pat 2,562,161 (Cluett, Peabody & Co——Epelberg, Pemrick——July 31, 1951)

Stabilizing rayon yarns is effected according to the present invention by the application of reaction products of glyoxal and aliphatic acid amides that contain a chain of less than 6 C-atoms (according to the claims——less than 4 C-atoms). Textiles are impregnated with an aqueous solution of these reaction products, catalyzed by an acid, squeezed and dried at elevated temperatures.

The reaction product of glyoxal and an acid amide, preferably formamide, can be formed spontaneously at room temperature; elevated temperatures are not necessary and are required only in reactions with higher amides. Glyoxal, which is commercially available in about 30% aqueous solution, is decidedly acid, the pH ranging from 1.00-1.30. The reaction between acetamide and glyoxal is slightly endothermic, giving complex compounds of the structure: $CH_3CON{:}CH\text{-}CH{:}NCOH_3$. This product catalyzed with chlorides of Al, Sn, Ca, with $ZrOCl_2$ or other acid reacting substances forms further reaction products with cellulose, probably by a complicated cross-linking reaction. Drawbacks which had to be overcome are the formation of brown-yellowish colored by-products and the attacking of fibers by certain acid catalysts. It has been found that aluminum or tin chlorides minimize discoloration; the hand is best with aluminum chloride, while $SnCl_4$ gives a resinous touch to the finished fabric. As a rule the catalysts ought to have a substantial acidic component, since the acid character is not destroyed when the product is concentrated to approximate dryness.

Example: a 100% viscose rayon fabric was impregnated with a solution of the glyoxal-acetamide condensate, catalyzed with a mixture of 2 p $AlCl_3$ and one p $SnCl_4$. The pH was 1.0. The fabric was squeezed to a pick-up of 110%, dried in a tenter frame to the desired dimensions in length and width, cured at 250° F and washed. Stability, tensile strength and abrasion resistance were definitely improved.

The strongly acid nature of this finish precludes its use on fabrics, as it contains large amounts of cotton, which might severely be damaged in this treatment. The method cannot be further recommended for fabrics containing protein fibers, generally discoloring them. The claims refer therefore only to fabrics that are predominantly regenerated cellulose.

References cited by the Patent Office:

U S Pat 2,165,265 (I G Farben/1939): hydrophobing textiles by treating them with a high substituted compound able to react with an aldehyde, e g, octadecyl heptadecyl urea in pyridine, immersion in liquid formaldehyde and curing at 110° C.

U S Pat 2,211,976 (Gen Aniline/1940): hydrophobing cellulosic fibers by incorporating an n-methylolcompound of an acid amide of a monocarboxylic acid, e g, methylolstearamide, and heating to 110° C.

U S Pat 2,242,051 (Heberlein Patents/1941): condensates of higher amides, e g, stearic acid amides with dialdehydes (glyoxal), used as water repellent agents. These are applied from organic solvents and catalyzed by acids, such as lactic acid.

Brit P 484,691 (Raduner/1936): obtaining wrinkle-resistant textiles by reacting cellulosic material directly with aldehydes in the presence of catalysts. Water repellency may be obtained by impregnating with a higher fatty amide and an aldehyde, stretching the fabrics to the desired dimensions and curing thereafter.

Further reference is made to cellulose fiber stabilizing treatments using glyoxal as an essential component, e g, U S Pat 1,857,263 (I G Farben/1932); combining with polyvinylalcohol (Brit P 586,598 and 586,637, cf *Am Dyestuff Reptr 37,* 103, 1948); combining with magnesiumsilicofluoride (U S Pat 2,521,328, cf *Am Dyestuff Reptr 40,* 68, 1951); or combining with salts of oxidizing agents (U S Pat 2,484,545, cf *Am Dyestuff Reptr 39,* 97, 1950). Condensates of glyoxal with lower acid amides have apparently not been suggested hitherto for the same purpose.

PAD DYEING APPARATUS ——Small Dyebath Formed between Padding Rollers C, 6

U S Pat 2,562,457 (Morton Sundour Fabrics Ltd—Hannay, et al—July 31, 1951).

In conventional pad dyeing devices the fabrics are first impregnated in a dyebath of rather large volume and then passed through the nip of two squeezing rolls (or a double nip). This specification states that nonuniform results might occur because of only partial adsorption, thus decreasing the concentration of the dyebath, which has to be permanently adjusted to the original strength. A further disadvantage is that the squeezed liquor flows down over the material, sometimes forming streaks by partial adsorption.

The present invention provides a device in which a small amount of the dyebath collects in the space between two adjacent

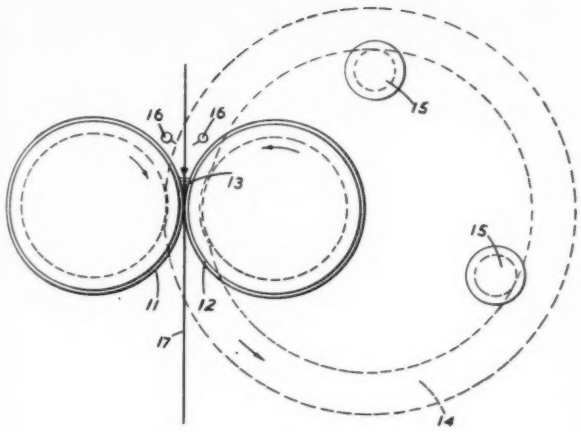


Figure 1—USP 2,562,457

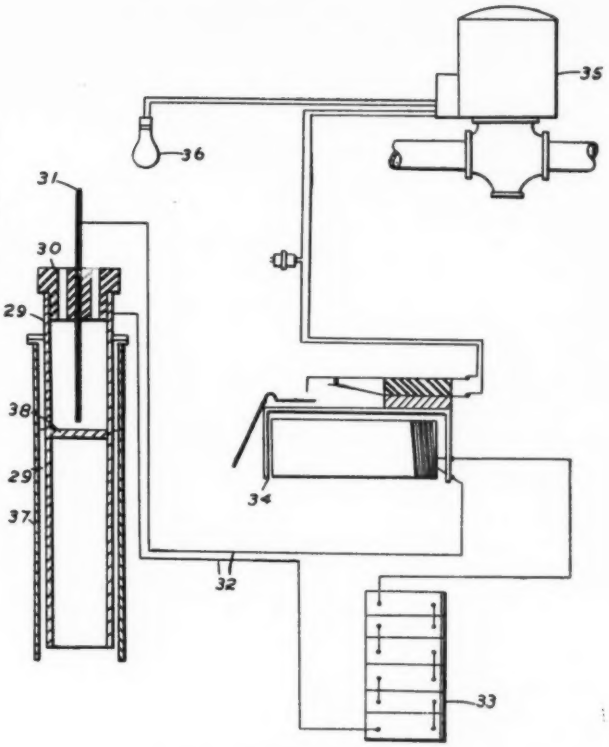


Figure 2—USP 2,562,457

horizontal rollers (see Fig 1). Fabric (1/) passing vertically downward between rollers (11 and 12) takes up within 30 seconds about the same amount of dye liquid as that delivered equally by perforated pipes (16), which extend along the entire width of the fabric. The nip is closed hermetically on both ends of the rollers by endless soft rubber belts (14) (shown in dotted lines), which are supported by pulleys (15). Belt (14) is of considerably greater breadth than width and is also thicker than the grooves of the rollers in order to firmly close the bath sidewise, which is accomplished by squeezing the rubber material against the walls of the rollers.

The supply of dye liquid is regulated either by manual control or by automatic means. In the latter event a tube (37), containing an inner tube (29), is dipped into the dye bath. A float (38) contacts an electrode (31) at a specific level, thereby closing an electric current and stopping the flow of dye liquid by closing of the feed valve (35) until the quantity of dye liquor is again reduced to the original bath volume (see Fig 2).

References cited by the Patent Office:

U S Pat 2,337,390 (General Bandages Inc/1943): producing self-adhering bandages by impregnating with latex ammonia and thereupon neutralizing with acetic acid. Scum formation on the fabrics is avoided by blowing air into the latex impregnated material, thereby volatilizing the predominant part of the ammonia.

U S Pat 2,257,113 (K-C-M Company/1941): a coating apparatus using a vacuum chamber through which the fabric (generally paper) is driven after being coated with liquid. The liquid is doctored off by a stationary blade provided with a suction gap.

U S Pat 2,015,531 (Champion Paper & Filter Co/1935): a roll coating machine for paper wherein the web is introduced between two rollers; the coating roller carrying the impregnating liquid rotates in the coating composition and is wiped clean by a doctor before contact with the web.

U S Pat 1,153,245 (Nivling/1915): a form of a sizing apparatus in which the sizing liquid is kept at a constant level by means of an overflow system.

Further reference is made to Ger P 578,308 (Haubold), which describes an impregnating device for pad dyeing consisting of three adjacent rollers. The fabric enters the device between the first and second rollers and leaves it between the second and third in a vertical direction.

U S Pat 1,946,627 (Karrer/1934): describes a machine for wet treatment of fabrics that is characterized by a small dyebath formed in the space between four rollers and closed laterally by means of sealing plates pressed against the rollers by springs.

For information on reservoir forming rollers in dyeing machines see Dungler's U S Pat 2,511,625 and the jig construction described in Deck's Brit P 432,094.

ABSTRACTS

Dyeing Wool/Nylon Fiber Blends

W Hees, *Canadian Textile J* 68, 52-53, 55, 59, August 31, 1951.
(A Technical Communication from Farbenfabriken Bayer, Leverkusen).

Since the year 1946 textiles manufactured with mixtures of wool and polyamide fibers have become increasingly important owing to their superior technical properties in service. The superior properties of this two-fiber system are due to the great strength of the polyamide fibers.

By mixing 1 per cent of nylon fiber with wool the strength of the resulting mixed yarn is increased by about 4 per cent; i e, a mixed yarn consisting of 75 per cent of wool and 25 per cent of nylon possesses approximately twice the strength of a woolen yarn of the same count. The resistance to abrasion of a

fabric woven with such yarn is likewise increased two- to three fold.

The dyeing of wool-nylon mixtures required a thorough testing of the acid dyestuffs suitable for wool. The most important acid dyes known, and special types of this class, were tested for their ability to dye different fibers to the same shade, as well as for constitutional relationships which might possibly reveal the chemical laws involved.

The author discusses the theory of polyamide fiber dyeing and calls attention to the following facts, some of which have been frequently mentioned in the literature:

1. The ability of both wool and nylon to absorb acid dyes is a function of their basic groups; i e, the quantity of dye fixed is directly proportional to the number of basic amino groups contained in the fiber. In practice, wool can fix approximately 30 per cent of a commercial dyestuff and nylon a maximum of only 1 to 5 per cent.

2. By increasing the acidity of the bath to a pH of 1, nylon can be made to absorb still more dye, but the tensile strength of the fibers is greatly reduced.

3. The saturation point of the nylon fiber is limited for all dyes, but varies according to the constitution of the dye. The relevant factors here are:

(a) The equivalent weight of the dyestuff, depending upon the molecular weight and number of the sulfo or carbonyl groups in the molecule.

(b) The presence of certain substituents and coupling components.

4. A dye of high affinity for the nylon can displace a dye of low affinity; this is known as the "blocking" effect.

The author then describes the results of his dyeing trials, which included acid dyes of all chemical classes. These trials revealed the following facts:

The most suitable acid dyestuffs are the monosulfonic acid dyes which, owing to their higher saturation point, make it possible to obtain on both fibers deeper and more uniform colors. Disulfonic acid dyes are absorbed more by the wool; consequently, combinations of mono- and disulfonic acid dyes are with few exceptions unsuitable.

The best dyes for these two-fiber mixtures are those which possess good affinity for both fibers within a pH range of 3 to 7. Those which will dye neutral are found to be the most suitable.

The optimum temperature for maximum levelness is at 203-209°F. At this temperature the nylon fiber has maximum absorbing power for dyes.

The author concludes from these exhaustive tests that the dyer is unable to select the most suitable products from the extensive acid dyesuff range for goods of mixed wool and nylon fibers without an exact knowledge of the chemistry of dyes.

Eighteen references to the literature are cited.—WHC

Reduction of Direct Dyes During the Dyeing of Viscose Rayon

W Armfield, *J Soc Dyers Colourists* 67, 297-301, August, 1951.

From time to time it has been noticed in the Droylsden dyehouse that certain direct dyes reduce during the course of dyeing of viscose rayon cakes. Reduction of dyes during skein dyeing on Gerber-type machines has also been noticed on rare occasions. In order to save fuel by reducing heat losses, some of the cake-dyeing machines have been enclosed, and on these machines reduction of dyes has occurred to a greater extent than on the uncovered machines. Increased reduction trouble has also been reported in the case of enclosed winches, compared with the ordinary open winch.

It has been found that the cause of this reduction is the presence of alkali in the dye bath. Some direct dyes contain sufficient alkali to cause reduction of other dyes with which they are combined, although they themselves may not be affected. For example, one direct dye was found to contain 42 per cent sodium carbonate.

With increase in temperature the reduction increases, and at the boil considerably more reduction takes place than at 90° C.

Dyeing in enclosed machines favors reduction owing to the restricted air space, but the effect of this can be overcome by blowing air over the surface or through the dye liquor. Lowering the pH of the dye liquor decreases the tendency of dyes to reduce during dyeing. Addition of such a substance as ammonium sulfate or chloride prevents reduction altogether even when dyeing at temperatures near the boil, in all but exceptional cases.

The pH values of a number of aqueous dye solutions are listed, and a simple method is described whereby the susceptibility of direct dyes to reduction can be determined. A number of dyes have been tested and are classified into four groups, according to whether they show considerable, moderate, slight, or no reduction. —WHC

Water Repellency of Textiles

T R Harding, *J Textile Institute* 42, P691-702, August, 1951.
(read at Textile Institute Conference)

The requirements of the public for garments which, while being resistant to moisture, can be worn for indefinite periods without discomfort, has led to an ever increasing demand for water-repellent fabrics, with the result that articles of clothing which were at one time made entirely of waterproof cloths are now made almost exclusively from material given a water-repellent finish.

Substances covering a wide range are employed as water-repellent agents, varying widely in character. They may, however, be classified:

(1) aluminum compounds
(2) zirconium compounds
(3) fats and waxes
(4) proteins
(5) compounds capable of entering into chemical combination with the textile fiber substance
(6) synthetic compounds of high molecular weight.

Some of the earliest processes for obtaining water-repellent finishes employed a solution of aluminum acetate. The fabric was steeped in this for 9 to 20 hours and then dried, after which insoluble basic aluminum acetate remained on the fiber. Later, aluminum soap was used, being applied usually by a two-bath process, and this is still employed up to the present time.

In the last ten years or so various patents have appeared describing the application of zirconium salts to textiles to obtain water-repellence. As an example, viscose staple or wool flannel is treated for 2 to 3 minutes at 90° C with zirconium oxychloride (buffered with sodium acetate), then dried at 100° C for 20 minutes.

The most important method, and the one most generally employed at present, is a one-bath process which utilizes an emulsion of wax in a solution of aluminum acetate or formate.

Numerous processes have appeared utilizing protein substances such as glue, gelatine and casein. They all depend on the fact that these products are rendered insoluble by the action of bichromates, formaldehyde, tannin or aluminum compounds.

During the last fifteen years or so much research has been carried out with a view of obtaining water-repellent finishes which, by chemical combination with the fiber substance of a hydrophobic radicle, would be resistant to dry cleaning and washing. In 1937 a complex quaternary ammonium compound resistant to both of these treatments was brought out under the name of Velan (Zelan in U S).

Recently the Dow Corning Corporation has marketed a silicone polymer, DeCetex 104, which gives a durable water-repellent finish to textiles. It is most conveniently applied as an oil-in-water emulsion. It is stated to be particularly suitable for nylon and acetate fabrics.—WHC

NEWS

• New Process for Dyeing Dynel

A new process for dyeing dynel with mixtures of acid and acetate type dyes has been announced by Carbide and Carbon Chemicals Company, a division of Union Carbide and Carbon Corporation, producer of the acrylic staple fiber.

Principal feature of the new method, according to T A Feild of Carbide's Textile Fibers Department, is the controlled addition of copper with reducing agent to the dyebath, thereby permitting a controlled rate of dyeing and dyestuff exhaustion. The process reportedly has been successfully employed in stock, top and package dyeing of dynel. Adaptation of the procedure to piece dyeing is in process.

The technique was originally developed to make up straightforward and practical procedures for dyeing dynel for use on jersey for the Marine Corps, Army serge and Navy melton. It is also said to be useful in controlling the exhaustion of acid type colors with reduced copper in dyeing dynel and other acrylic fibers.

In mixed acid and acetate dye formulations where acetate colors, usually lightfast yellows, are employed, normal acetate dyeing procedure for dynel is begun, according to Mr Feild. Dyeing is carried out at a boil for 20 minutes, often while sulfuric acid is added slowly to adjust the pH to a value of about 5.5. After an additional 20 minutes at a boil, copper sulfate, mixed cold with a reducing agent outside the bath is added slowly over a 20 minute period until the desired degree of exhaustion is realized. Corrections with either acid or acetate dyes may be made, it is stated, and additional copper with reducing agent may be added, if necessary to obtain maximum exhaustion.

Mr Feild has cited a typical mixed dye formula employing the new procedure for a navy blue, in which the following dyes and assistants are used:

Anhydrous Cupric Sulfate	2.0%
Zinc formaldehyde Sulfoxylate	0.8
Anthraquinone Blue SWF 150%	4.0
Eastman Fast Yellow 4 RLF	2.8
Eastman Fast Red GLF	2.8
Anhydrous Sodium Sulfate (For relustering 15/1)	100.0

In a particularly deep navy blue shade, 14% dyestuff has been exhausted by this technique without the use of a swelling agent, it is learned.

When an all acid type dye formula is employed to realize a deep shade, the use of p-phenylphenol may be necessary, depending on the particular dyestuffs used.

• Important Advances Seen in New Dan River Process

Upon the conclusion of an address before the annual meeting of the Textile Research Institute on November 9, Russell B Newton, president of Dan River Mills revealed a new discovery by the research staff at Dan River that promises to have a tremendous effect in the application of viscose rayon.

The new discovery extends flat abrasive strength and the flex life of viscose far beyond accepted standards, greatly increasing wear-life, according to Mr Newton. Positive shrinkage control and the elimination of progressive shrinkage are provided as well, according to reports.

The research staff has called the discovery X-2. Its benefits are said to be permanent since it serves to alter the structure of the viscose fiber at the -OH- molecule. It is not a resin, but reportedly can be applied on standard equipment already in use by rayon finishing plants.

Other merits of the new process as cited by Dan River Mills: it will not retain chlorine; it is resistant to alkaline and acid bleaches used by commercial laundries; it will not cause yellowing of white goods; degree of wrinkle resistance may be predetermined; no odor problem; stretching, like shrinking, is completely controlled; and variations in desired hand or finish are endless.

After seven years in the laboratory, "X-2" is out of the pilot plant with production on a commercial scale under way. Dan River officials state that several ranges of staple and fancy all-viscose fabrics (chiefly suitings and shirtings) will be up for general sale next year.

It is the announced intention of Dan River Mills to make "X-2" available to the industry "at the earliest possible date".

• 'Cenco News Chats' Honors AATCC

Cenco News Chats, quarterly publication of the Central Scientific Company, 1700 Irving Park Road, Chicago 13, Ill, salutes the textile industry in its Fall 1951 Number.

Two pages are devoted to an outline of the history and objectives of the AATCC and another two to a biography of its founder, Louis Atwell Olney.

In an opening paragraph the *Cenco News* states that "it is not accidental that the period of most significant development of the textile wet processing industry coincides with the growth of the American Association of Textile Chemists and Colorists". They point out that "the major development of the textile industry may be said to have taken place in relatively recent years" and "in the special field of wet processing the technical advances of the last 25 years have revolutionized procedures, stabilized processes and improved the quality and quantity of finished textiles".

The Trio Responsible for Development of Dan River Mills' X-2 Process
L to r: L K Fitzgerald, research and development manager; Russell B Newton, president; and Dr H Y Jennings, research director.

• 22nd Annual TRI Meeting Attracts Over 500

More than 500 technicians and scientists were in attendance at the technical and general sessions of the 22nd Annual Meeting of the Textile Research Institute, Inc, held earlier this month at the Hotel Statler, New York. The last day of the 3-day parley was featured by an Open House at the TRI Laboratories in Princeton, N J.

James H Wakelin, TRI director of research acted as Chairman of the day for the technical session on November 8. The morning session, over which Milton Harris, president of Harris Research Laboratories, presided, featured two papers: "An Analysis of the Consumer Quality Characteristics of Cotton: Implications for Research", by George S Buck, Jr, technical director, National Cotton Council of America, and "The Properties of Apparel Wools as Affected by the Processes of Worsted Manufacture" by Mr Wakelin and Werner von Bergen, director of research, Forstmann Woolen Company. Walter J Hamburger, director of Fabric Research Laboratories, Inc, served as Chairman of the afternoon session. This also featured two papers, "Properties of Fabrics Made From Several Synthetic Fibers and Their Impact on the Textile Industry" by G K Lake, director of research, Pepperell Manufacturing Company and "Role of the Synthetic Fibers in the Textile Industry of the Future" by Linton G Ray, Jr, Rayon Dept, E I du Pont de Nemours & Co, Inc.

John H Dillon, director of the Textile Research Institute, acted as Chairman of the Day on Friday, November 9, which featured a Symposium, "Impacts of Research in the Textile Industry". Speakers included Richard D Wells, director of Research, Bates Manufacturing Company, "Position of the Textile Industry in Relation to Research and Development"; Walter Regnery, president, Joanna Cotton Mills Company, "Blending of Cotton by Fineness Determination and Other Applications of Research in Mill Operation"; Kenneth R Fox, vice president and technical director, Burlington Mills Corp, "Technical Problems of the Textile Industry"; and Russell B Newton, president, Dan River Mills, "The Research Laboratory Pays Dividends".

Alan T Waterman, director of the National Science Foundation was the Luncheon Speaker on Friday. His topic was "Building Our National Scientific Capital to Yield Applied Interest for Industry in the Future".

Exhibits in conjunction with the meeting were devoted to laboratory, control and mill equipment, as well as to a number of new synthetic fibers.

Burwell Abbott (right), famous caricaturist, sizes up C Norris Rabold, AATCC president at that association's recent convention in New York. Looking on (center) is Thomas T Allan, New England representative of the Virginia Smelting Company, which featured Abbott at their booth at the show and presented ceramic studies done by hand to the visiting delegates.

• SCS Withdrawn from Market

Tennessee Eastman Company has announced the withdrawal of their experimental water soluble cellulose gum, Sodium Cellulose Sulfate. In view of other commitments and the present tight supply of chemical processing equipment and raw materials, TEC has felt it advisable to suspend indefinitely further promotion of SCS. Samples and technical data are no longer being offered.

• Spectrolenes Featured by Hilton-Davis at AATCC Convention

Spectrolenes, new fast color bases that are said to mix rapidly with combinations of naphthols to provide a large number of brilliant shades of fresh dyes, were featured in the Hilton-Davis Chemical Company exhibit at the recent AATCC National Convention.

Nelson S Knaggs, vice president in charge of sales for Hilton-Davis, reports that the Spectrolenes, which were introduced several months ago, have already had a wide acceptance in the industry. Bases and naphthols are put together right at textile finishing plants, according to a new method for mixing developed by the Cincinnati firm.

Hilton-Davis Booth at AATCC Convention

The drape flowing from the plastic prism in colors of the spectrum, was printed with Spectrolenes to demonstrate their brilliant effect.

• CSMA Detergents Division Announces Program

The Soap, Detergents and Sanitary Chemical Products Division of the Chemical Specialties Manufacturers Association has arranged the following program for the Association's semiannual meeting, which is being held at the Hotel Mayflower in Washington, D C on December 3rd and 4th, 1951:

"Evaluation of the Foam of Soaps and Detergents"—Dr J Ross, Colgate-Palmolive-Peet Co.

"Present Trends in Cotton Detergency Testing"—Dr J M Lambert, General Aniline & Film Corp.

"Cleansers and Dermatitis"—Dr L Schwartz.

"Evaluation of Commercial Surfactants"—Dr H L Sanders, Ninol Laboratories.

"Automatic Liquid Soap Production"—R J Ballentine and W S Jessop, U S Sanitary Specialties.

"Variables in Fatty Acids Which Affect Clarity and Viscosity of Potash Soap Solution"—L L Sutker, Wilson Martin Division

"Sequestering Action of Polyphosphates"—L C Dormuth, Pennsylvania Salt Co.

"Corrosion Control in Detergents with Sodium Silicates"—E A Robinson, Diamond Alkali Co.

• NPA Chemical Chiefs Meet with Business Paper Editors

Representatives of several of the nation's largest business papers were on hand in Washington October 12 for a second general session with leaders of the Chemical Division, National Production Authority and Defense Production Authority. As pointed out in the introductory remarks of Edward K Moss, assistant administrator for public information, the meeting was an attempt to give members of the business press an opportunity to meet with the operating heads of those operating units of the two agencies (NPA, DPA) which have direct responsibility for matters in which attending press representatives were most interested. Mr Moss represented Manly Fleischmann, DPA-NPA administrator who was unable to attend.

Mr Moss outlined how the agencies will handle information in the future in view of the President's recent executive order on security information, after which Rollen B Kadesch, director of the information division, Office of Public Information, welcomed the group. Clyde La Motte, also of the Office of Public Information, acted in the capacity of chairman over the session.

Director Kenneth H Klipstein of the Chemical Division, was the first speaker on the agenda. He was followed, in succession, by Frederic Arden, chief, Inorganic and Agricultural Chemicals Branch; Louis A Schlueter, chief, Coal Tar Chemicals, Dyes and Intermediates Branch; Frank E Bennett, chief, Drugs, Solvents and Detergents Branch; Lowell B Kilgore, chief, Plastics and Protective Coatings Branch; Leroy C Stewart, chief, Facilities Branch; and Osgood V Tracy, newly-appointed deputy director, NPA Chemical division. Messrs Arden, Schlueter, Bennett and Kilgore represented the commodity branches of the division and Mr Stewart and Mr Tracy, the service branches.

Mr Klipstein paid tribute to all segments the chemical industry for their "magnificent cooperation", stating that "without their help we just couldn't have functioned here". He pointed out that the division is covering a bigger industry with only approximately 20% of the people that WPB had during World War II, in turn keeping allocations and controls to a minimum. This he attributes to three factors, one of which is the Industry's acceptance of voluntary allocations, cooperation, and general understanding.

Reference was made by Mr Klipstein to general allocation Order M-45, covering the chemicals now under allocation, and to which some may have to be added. He also explained the Division's use of Order M-32, which divides the load of defense business so as to disrupt normal business as little as possible. As an example of a new type order as far as the chemical industry is concerned, Mr Klipstein explained limitation order M-69, the sulfur limitation order.

The biggest problem of the Division, in Mr Klipstein's estimation is the one of trying to make the chemical industry better understood by the various claimant agencies and other Divisions of NPA. Along those lines, he outlined the Chemical Division's course of action to this point and projected plans for future operations.

Mr Arden, in his remarks, predicted the production of 10,000 tons/day of chlorine by the end of 1953, more than normally needed according to NPA estimates. As to sulfuric acid, Mr Arden feels that there will be less waste in the future, with greater use of the proposed 14 million tons to be produced. He points out that we do not have the sulfur to produce all the acid being requested today, however, even though more plants are being installed, more acid is being recovered from smelter fumes, and more sulfur is being recovered from sour gas and petroleum lines. He does not feel that we have the native crude sulfur in this country to expand the production of acid as our general economy expands, and that apparently we have got to use more expensive sulfur sources. "As far as defense is concerned", Mr Arden stated, "we have no problems on sulfur and sulfuric acid. We have plenty for those purposes, but the civilian products will suffer".

Mr Schlueter stated that production of one of the products under allocation, namely Resorcinol, has a goal of approximately double the capacity "in about another year". He predicted an increase of 125 million tons of phthalic anhydride over the 1950 capacity of 225 million.

In the question and answer period, which followed the program, a series of questions was put to the panel relative to what chemicals might be "trouble" spots in the event of a surge in the textile industry. Heavy military requirements on mildew-proofing agents and other treating compounds were cited by Mr Schlueter, and requirements for anthraquinone and naphthalene may pinch, it was agreed, even with increased production slated for both. The supply of sodium hydrosulfide is a sulfur proposition, and may be another source of trouble, but sodium nitrite and melamine resins look to be in plentiful supply after the first quarter of 1952, it was indicated.

Regular future meetings of the business press and the Chemical Division appear to be in the offing.

Members of the Business Press Assembled with Representatives of the Chemical Division, NPA

NAMES IN THE NEWS

Richard L Demmerle

• Demmerle Assumes GAF Post

RICHARD L DEMMERLE has resigned as executive editor of *Chemical Week* to become assistant director of Administration of General Aniline & Film Corporation.

Mr Demmerle, from 1942 to 1945, was administrative officer to the director of research, Manhattan Project Laboratories. He became associate editor of *Chemical Engineering News* and *Industrial and Engineering Chemistry* in 1945, and left these American Chemical Society publications to join McGraw-Hill in 1950.

• New Sergeant Chemical Executive

Rudolph Aeberle, president of E M Sergeant Pulp and Chemical Company, Inc, of New York, has announced the election of GEORGE W POLAND, JR, as a vice president and as president of its New Jersey subsidiary, Sergeant Chemical Company, Newark.

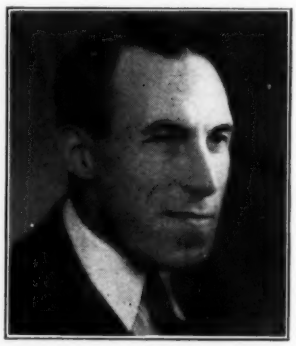
Mr Poland recently resigned as assistant sales manager of Stauffer Chemical Company, where he had been for 15 years. Previously, he was with the American Agricultural Chemical Corporation.

George W Poland, Jr

Adger S Johnson

• Johnson Becomes National Carbon President

ADGER S JOHNSON has been appointed president of National Carbon Company, a division of Union Carbide & Carbon Corporation, according to an announcement by J M Spangler, National Carbon chairman. Mr Johnson has been vice-president and general manager of the company since May, 1950. He entered the employ of the company in 1933.



William F Brosnan

• Brosnan Appointed to LTI Board of Trustees

WILLIAM F BROSNAN, president-treasurer of the Esquire Processing Co, Bondsville, Mass, has been appointed by Massachusetts Governor Paul A Dever to serve on the Board of Trustees of the Lowell Textile Institute.

Mr Brosnan, an AATCC member, is an alumnus of LTI, class of '27.

• Miss Falcone Named to New GHI Post

The editors of *Good Housekeeping* have announced the appointment of MARIE ANTOINETTE FALCONE as associate director of the Textile Laboratory of the Good Housekeeping Institute. Her duties will include supervision of the laboratory investigations of textile products and keeping in touch with new developments in fabrics and textile products in general. She will assist the Director, DR W E COUGHLIN, in editorial work.

Marie A Falcone

Miss Falcone comes to Good Housekeeping from the Associated Merchandising Corporation where for nine years she was head of the Bureau of Merchandise Standards. Previous to this she was on the staff of the Textile Laboratory of the Good Housekeeping Institute.

• Spearman Joins Seydel-Woolley

J E SPEARMAN has joined Seydel-Woolley & Company, Atlanta, Ga, textile chemical manufacturers, in sales and service work. Mr Spearman, who had previously been associated with North American Rayon Corporation at Elizabethton, Tenn, and American Enka Corporation, Enka, N C, will sell to the wet-finishing division of the industry.

J E Spearman

William M Keller

Lloyd S Wainfor

G L Browning, Jr

• New Fiberglas Appointees

WILLIAM M KELLER has been named general factories manager of the Fiberglas Textile Products Division. Since March, 1950, he had been manager of the Huntingdon, Pa, Fiberglas Textile plant. LLOYD S WAINFOR, who has served at Huntingdon for the same period (most recently as production manager) succeeds Mr Keller to the managerial post. Both appointments were announced by John H Thomas, general manager of the Fiberglas Textile Products Division and vice president of Owens-Corning Fiberglas Corporation.

In his new position, Mr Keller will have his headquarters at 16 East 56th Street, New York, N Y. He will have charge of all Fiberglas textile yarn manufacturing operations of plants in Huntingdon; Ashton, Rhode Island, and Anderson, South Carolina.

• Browning Accepts Synthron Post

GEORGE LANDON BROWNING, JR, has accepted a position as field technical representative for Synthron, Inc, Ashton, R I. He will represent the company in the Southern textile states and expects to make his home in the Winston-Salem area.

Dr Browning has been in New England since 1945, first as manager of plastics for the Boston Woven Hose and Rubber Company and more recently as a technical salesman for the Raw Materials Company, also of Boston. Prior to that, he was employed for more than five years by the B F Goodrich Company in Akron and Cleveland, Ohio.

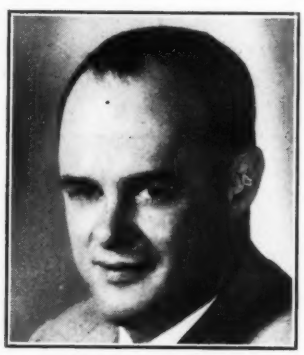
• Pfizer Elects John J Powers, Jr as New Vice President

The creation of a new vice-presidency, and the election of JOHN J POWERS, JR to fill the post, was recently announced by Chas Pfizer & Co, Inc, 102-year-old Brooklyn chemical firm.

According to John E McKeen, president,"Mr Powers initially will be on special assignment from my office assuming responsibility for all of the company's foreign activities, including the operations of the Pfizer foreign trade subsidiaries—Pfizer Canada, Ltd, Laboratorios Pfizer, S A, Pfizer International Corporation, and Pfizer Ltd. Mr Powers will continue in this capcity," Mr McKeen said, "during the present period of expansion and change in the scope and character of the foreign trade activities."

DONALD HILTON will continue as president of the Pfizer subsidiaries and as director of Pfizer's foreign sales.

Mr Powers has relinquished the position of secretary to ROBERT C PORTER, former company counsel and head of the legal department.



John J Powers, Jr

• Tracy Succeeds Klipstein as NPA Chemical Division Director

The National Production Authority, U S Department of Commerce, announced on November 8th the appointment of OSGOOD V TRACY as director of their Chemical Division. Mr Tracy, who is on leave as general manager of the Chemical Products Department of Esso Standard Oil Company, was named deputy director of the Chemical Division on October 12.

His appointment as director is one of three personnel changes being made in a realignment of NPA's Chemical, Rubber and Forest Products Bureau. On Nov 1 NPA announced the appointment of KENNETH H KLIPSTEIN, former director of the Chemical Division, as assistant administrator to head the Chemical, Rubber and Forest Products Bureau. He succeeded FRANCIS J CURTIS whose resignation became effective on the 8th.

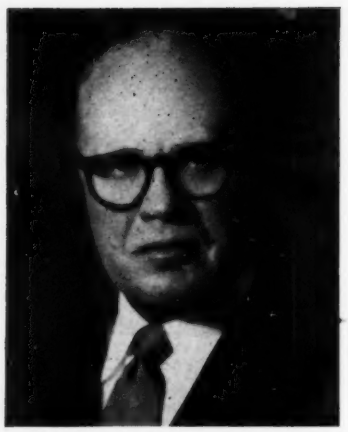
In the third change LAWRENCE W STRATTNER administrative vice-president of the West Virginia Pulp and Paper Company of New York, was appointed deputy assistant administrator of the Bureau. He succeeded GABRIEL J TICOULAT, who was recently named deputy administrator for International Problems of the Defense Production Administration.

• Vollers to Represent Synthron in Mid-Atlantic States

LUDWIG P VOLLERS JR has accepted a position as field technical representative for Synthron, Inc, manufacturing chemists of Ashton, R I. He will represent the company in Pennsylvania, New York and New Jersey.

Mr Vollers for the past year has been research and technical director of the Guyan Mills in Valley Falls, R I. Before that he was a field representative for the nylon division of the duPont Company.

L P Vollers



Arthur L Snyder

Robert K Kennedy

Robert W Gaines

• Union Carbide Appointments In Textile Fibers Department

Howard S Bunn, vice-president of Carbide and Carbon Chemicals Company, a division of Union Carbide and Carbon Corporation, recently announced the appointments of ARTHUR L SNYDER as assistant sales manager and ROBERT K KENNEDY as advertising manager of the Textile Fibers Department. Mr Snyder will be in charge of the sales program on apparel uses for dynel. ROBERT W GAINES has been named to head the sales and sales development program for industrial and household uses of the fiber.

Mr Snyder was formerly technical manager of the Flat Goods Division of Burlington Mills Corporation. Previously, he had served for over 23 years in various capacities with the Rayon Department of E I duPont de Nemours & Company, Inc. An AATCC member, he has been associated with Carbide's Textile Fibers Department since March 1950, concentrating on the development of dynel in the knit goods field.

Mr Kennedy has been with Union Carbide since 1935. From 1945 to 1950, he was manager of the Chemicals Division, General Publicity Department. In August, 1950, he was transferred to the Textile Fibers Department. Mr Gaines joined Union Carbide to work on the development of new processes for the production of Vinylite resins at South Carleston, West Virginia. From 1944 to 1949 he was associated with the production of the company's textile fibers, and transferred to New York in 1949 to assist with sales development of dynel.

• Brumberger Heads Nuodex Fungicide Sales

ROBERT C BRUMBERGER became manager of fungicide sales for Nuodex Products Co, Inc, on October 1, according to an announcement by John W Van Tuin, general sales manager of the company. Mr Brumberger's duties include supervision of the company's agents throughout the country in contacts with the textile trade. He also acts as a technical advisor on the use of Nuodex fungicides in textile applications.

Mr Brumberger was formerly general manager of Andrew Wilson, Inc, chemical manufacturing company in Springfield, N J.

• New duPont Post for Wesp

DR EDWARD F WESP, assistant manager of the duPont Company's Rayon Planning Division since February, has been made assistant director of production for Orlon. A B Walmsley, Jr, is director.

• Ledin Assumes GE Post in Bridgeport

CHARLES C LEDIN has been appointed product service engineer for General Electric home laundry equipment.

Mr Ledin joined the Company in 1941 at Lynn, Mass. He subsequently served in various engineering capacities at Bloomfield, N J, and Schenectady, N Y until 1948 when he became the appliance service representative in the Great Lakes District. Since July of this year he has been in Bridgeport as assistant product service engineer on home laundry equipment. In his present position, he succeeds the late THOMAS B O'GARA.

• Ring Joins Wyandotte

RUSSELL D RING has joined the research-development division of Wyandotte Chemicals Corporation. His work at Wyandotte will involve the application of radio-active tracers to the study and measurement of efficiency of cleaning agents and processes.

• Prominent Germans Visit U S

THOMAS CLAPHAM, chief engineer and assistant to the director general, Farbenfabriken Bayer, Düsseldorf, Germany, and HEINZ HOLSTROM, export manager for the same firm are among recent European visitors to this country. A reception was recently tendered for them at the New York offices of Thomas Hodges.

• B-I-F Industries Adds Personnel

Announcement has been made by B-I-F Industries (Builders - Providence, Inc; %Proportioneers, Inc%; and Omega Machine Co) of the appointment of new personnel in Pittsburgh, Minneapolis, and Providence.

DOUGLASS TABER has joined the company as manager of the Pittsburgh office. Since 1936, Mr Taber has been associated with Greeley and Hansen Consulting Engineers of Chicago.

ALDEN CARPENTER, formerly with Hitchcock and Estabrook, Consulting Engineers of Minneapolis, will be in charge of the Minneapolis office located at 221 Sexton Bldg.

RAYMOND McINDOE, formerly with the Pennsylvania Dept of Health, has been appointed assistant manager of the Standard and Engineered Products Division of Builders-Providence, Inc.

OBITUARY

Richard E Jahr

RICHARD E JAHR, 52, secretary-treasurer of Standard Chemical Products, Inc, Hoboken, N J, died suddenly of a heart attack on October 17. Mr Jahr was a native of Union City, N J.

TECHNICAL LITERATURE

Authentic Prints of Early Textile Dyeing and Finishing

Standard Chemical Products, Inc
Hoboken, New Jersey
Available on request.

This work, which was prepared for Standard Chemical Products by the Stuart Company, is a collection of reproductions of old prints made in France almost two hundred years ago, portraying French dyeing and finishing methods of an era before the Revolution. Some of the processes shown have long since been discarded and forgotten, but many of the methods will be recognized by some similarity to present day textile industry practices.

The prints portray various phases of the industry. Plate I shows the interior of the main dyehouse of the Gobelin establishment circa 1770. Other subjects include the disposition of the vats, furnace entrances and various dyehouse implements; a hand truck for transporting furnace wood; rack for drying cloth; dye liquor barrel; reel for turning cloth in the dye vat; the interior of a silk dyehouse; large vats for reconditioning water by the use of bran; a method for wringing cloth; hand tools used in vat cleaning and dyeing operations; cloth dyeing and washing; cloth brushing; silk and wool dyehouse interior; master color samples; dyehouse basket and pail; Gobelin silk and wool drying room; scutching and twisting tools; various implements used in silk dyeing; washing silk skeins; saffron dyeing; drying room; and "branloire."

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(1) G-686—Alizarine Rubinol R-CF
(2) G-688—Violamine RR-CF
(3) AP-8—Blancophor SC High Conc New
(4) AP-11—rev Antarox G-100

General Dyestuff Corporation
435 Hudson Street
New York 14, N Y

These four comprise the latest of GDC's circulars giving introductory material, applications and properties for new products.

Alizarine Rubinol R-CF is reported as a straight, level-dyeing, fast-to-light acid dyestuff of the anthraquinone type, which produces very clear and bright bluish-red shades on wool. Additional uses follow from its good resistance to chrome and from its ability to exhaust adequately on wool and silk from a neutral bath.

Violamine RR-CF is a straight acid dyestuff (C I 758) with very good (4) level-dyeing properties, which produces very bright red-violet shades on wool and silk with fairly good fastness properties, according to the manufacturer. It is employed principally for wool knitting yarns and inexpensive women's wear but also in small quantities for brightening chrome dyeing. On silk dress goods it is reported to be useful for solid shades when brightness is most essential.

Blancophor SC High Conc New is a recent development in optical whitening agents for use in textile processing or commercial laundering. Its high fluorescence is said to be especially effective in imparting outstanding whiteness to otherwise ordinary whites and increasing the clarity and brightness of many pastel colors on cellulosic fibers.

Antarox G-100, when added to the spin bath during the manufacture of viscose rayon, acts as a dispersant for the solid materials such as sulfur, zinc sulfide, sodium sulfide, etc, which are present in the spin bath. It reportedly prevents clogging of spinnerets and the buildup, on spinning wheels, guides and rollers, of a bulky tacky deposit composed of the solid materials mentioned above. Antarox G -100 also is said to reduce clogging of the outlet lines from the spin bath to the filter and aids in the cold filtration of sludge coming from the spin bath. Consequently, the spinning operation is made more efficient through the reduction of filament breakage, and the quality of the spun yarn is improved because of greater uniformity of the filament itself.

Pittsburgh Chemicals

Pittsburgh Coke & Chemical Co
Grant Building
Pittsburgh 19, Pa
Available on request.

This is a summary of the principle products of five divisions of the Pittsburgh Coke & Chemical Company.

The 12-page letter-size bulletin lists important uses and applications of the products and, whenever possible, their specifications. There are sections devoted to the company's operations in coal chemicals, plasticizer, activated carbons, protective coatings and agricultural chemicals. The company's integrated production facilities and its unique basic position as a manufacturer of coal-derived chemicals are discussed briefly in the preface of the booklet.

Monsanto Booklet on New Sulfone

Merrimac Division
Monsanto Chemical Company
Everett, Massachusetts
Available on request.

Detailed information on a new sulfone, diamino diphenyl sulfone, technical, for dyestuff and other organic syntheses is included in this seven-page pamphlet. Physical and chemical properties are described and applications are suggested, such as the product's use as an intermediate in organic synthesis, as a base for ion-exchange resins, and in the synthesis of azo dyes.

Requests for copies should be addressed to L F Loutrel, Jr, Merrimac development director.

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(1) Indicating Pyrometers and Resistance Thermometers (Bulletin 1051)
(2) Vane Type Electric Contact Controllers (Catalog 8000)
(3) Characteristics of the Brown ElectroniK Continuous Balance System (Bulletin B15-12)

Minneapolis-Honeywell Regulator Company
Brown Instruments Division
Station 40
Wayne and Windrim Aves
Philadelphia 44, Pa

8-page illustrated Bulletin 1051 describes a new line of noncontrol pyrometers and resistance thermometers, which use the same high resistance plug-in galvanometer unit and two-comparment case employed in the line of Pyr-O-Vane and Protect-O-Vane electric contact controllers. Wiring diagrams and circuit information of pyrometer, resistance thermometer, tachometer and other actuations are included.

16-page Catalog 8000 illustrates and describes vane type electric contact control units used with the Electr-O-Vane thermometers and pressure gauges, and with the ElectroniK potentiometer, as well as those employed in the new Pyr-O-Vane and Protect-O-Vane millivoltmeters, to give snap-action on-off, two position or three position control.

Bulletin B15-12 gives a description of the circuit and discusses component characteristics of the amplifier and motor combination of the Brown "Continuous Balance" System. This is the first in a series of bulletins to aid in the adaptation of this equipment to many specialized applications.

Speedomax Daylight Recorder (Folder ND46-72(1))

Leeds & Northrup Company
4934 Stenton Avenue
Philadelphia 44, Pa
Available on request.

New equipment for continuous recording of daylight intensity is described in this folder. Illustrated with photographs of the Speedomax Recorder and an Illuminometer Cell Unit, the folder describes the operation and advantages of the equipment in recording variations in daylight illumination during agricultural and other outdoor tests where daylight is an important factor.

A brief specification section itemizes the important technical features, including mounting dimensions, of the recording instrument and the Illuminometer Cell Unit.

Current Methods of Dyeing Some of the New Synthetic Fibers and Blends

General Dyestuff Corporation
435 Hudson Street
New York 14, N Y

Representing current solutions to the various dyeing problems arising from the mushrooming growth of the synthetic fibers, this brochure also gives indications of the fastness properties which may be expected. It serves to indicate what synthetics and blends can be dyed satisfactorily now, and to predict some of the results and trends of the future. Limitations to be observed in dyeing of the new synthetics are detailed.

Methods for dyeing the following are outlined: Dacron, Dynel, Acrilan, Orlon, Vicara, nylon, acetate and nylon blends, Celcos, Saran and Fortisan.

Color Book on Suntone Pigment Colors

Suntone Color Department
Warwick Chemical Company Division
Sun Chemical Corporation
10-10 44th Avenue
Long Island City 1, N Y

This new color book covers Warwick's line of Suntone pigment colors for plastic printing. The colors offered comprise a complete line of single print shades that are said to be adequate to match substantially any color required in the printing of vinyl plastic sheeting. All represented products are of the latest type designed to meet requirements of high speed gravure printing.

As an aid to printers, the book also contains information covering the properties and uses of the colors.

Abbé Dispersall Mixer

Abbé Engineering Company
50 Church Street
New York 7, N Y

This 12-page brochure describes the use of the Abbé Dispersall Mixer for dispersing, emulsifying and milling in one operation. The Mixer reportedly is applicable to all kinds of fluid mixes from thin slurries to pastes.

Profusely illustrated, the brochure gives complete performance data, applications and specifications for Abbé Dispersall Mixers for thin to heavy slurries and for pastes and also for Abbé Laboratory Mixers for research and pilot plant work. In addition, other Abbé equipment is illustrated with brief sketches as to the application of each.

Physical Properties of Synthetic Organic Chemicals

Carbide and Carbon Chemicals Company
Union Carbide and Carbon Corporation
30 East 42nd St, New York 17, N Y
Available on request (ask for booklet F-6136)

The 1952 edition of this annual booklet presents 16 pages of data on more than 300 products, 38 of which have been added this year. Niacet chemicals are included for the first time and the number of aryl chemicals has grown to 29.

The chemicals are arranged by family groups. Condensed data on applications are presented and physical properties are given in tabular form.

Textile Finishing Machinery Catalog

Cook-P & N Machine Co
365 Dorchester Ave
Boston 27, Massachusetts
Available on request

This catalog is loose leaf bound and includes diagrams of steam pad dye ranges, cloth opening ranges and bleach ranges with full page technical descriptions and photos of all component machinery.

Bronze and Aluminum Powders

Atlantic Powdered Metals, Inc
38 Park Row
New York 7, N Y
Available on request.

The development by Atlantic Powdered Metals, Inc of special bronze and aluminum powders is covered in their new 8-page pamphlet.

The use of the powders in textile printing is suggested in addition to the many other fields of their application.

C A C Quarterly, 75th Anniversary Issue

The Clayton Aniline Co Ltd
Manchester 11, England

The Summer Issue of the quarterly C A C Magazine is devoted to the commemoration of the 75th anniversary of the company's inauguration. Photos serve to introduce the company's directors in the initial pages, after which a section on "Annals of the C A C" appears, including biographical annals and an outline of a line of loyalty by the Lomas family totaling 400 years of service.

Text material and photos outline the development of C A C's technical department and its Works Council (employee-management relations group). Thumbnail sketches of sporting honors attained by the company teams since 1926 are also included.

A section "The Veterans Recall" presents many interesting anecdotes relative to C A C activities, markets, etc, as told by men of many years service with the company.

Other sections that make up the issue include those on industrial relations, the Works Band, Export, Long Service Employees, and other personal jottings.

The Analysis of Alkalies

Solvay Sales Division
Advertising & Sales Promotion Dept
Allied Chemical & Dye Corp
40 Rector Street
New York 6, N Y
Available on request.

This technical and engineering service bulletin (No 9) is the revised (and enlarged) third edition, which contains 72 pages of text, tables, charts and indexes. New additions or revisions include the recalculation of analytical factors to the basis of the 1948 International Atomic Weights, a colorimetric test for iron and copper and a temperature correction table for volumetric solutions.

Oronite Copper and Zinc Naphthenates as Preservatives

Naftone, Inc
515 Madison Ave
New York 22, N Y
Available on request.

The use of the copper and zinc naphthenates to protect cellulosic materials against mildew, rot and fungus damage is discussed in detail. They are generally used to preserve wood products generally, textiles made from cotton, linen, jute and hemp, and any other fibers of cellulosic structure.

For Spring...

SANDOZ FORECASTS

Benedictine

a luscious golden spice

Spirited liqueur shades—yards and yards of skirts and stoles—make fashion news for spring. Particularly delightful is *Benedictine*, a rich, golden spicy shade named after the famous 16th Century French liqueur. To produce *Benedictine* in wool fabrics Sandoz recommends Alizarine Light Brown BL which is practically identical in its self shade. It possesses exceptional fastness to light along with good fastness to fulling and carbonizing. It may be dyed with or without chrome with equally good results, and has excellent level dyeing properties from a neutral bath. Alizarine Light Brown BL is also recommended for dyeing tans, taupes and camel shades where top light fastness is required such as other interesting liqueur tones which blend so perfectly with *Benedictine*—fashion selections for spring of The Textile Color Card Association. For forecast colors as well as perennial favorites... both natural and synthetic fibres...select from the Sandoz line of chrome, acid, direct dyes and auxiliary chemicals.

For light fastness in rayons and cottons, too

SANDOZ CHEMICAL WORKS, INC.,
61 Van Dam Street, New York 13, N. Y.
Application laboratories and stocks at
Boston, Philadelphia, Charlotte, Chicago,
Los Angeles, Toronto. Other branches at
Providence, Fairlawn, N. J., and Montreal.

SANDOZ thinks ahead with textiles

SANDOZ

For extreme light fastness for greys, sands, taupes

PYRAZOL Fast Rubine BLN

Pyrazol Fast Rubine BLN is an excellent red element for greys, sands, and taupes due to its extreme light fastness with or without urea formaldehyde resin. Combined with Pyrazol Fast Blue RUL or FGL and Pyrazol Fast Orange 4G it gives exceedingly good light fastness at moderate costs. Pyrazol Fast Rubine BLN is ideal for rayons and cottons for both men's and women's suitings, sport shirts, slacks.

It is a good leveling color, suitable for jig work, draws well and shows good exhaustion.

Excellent fastness to perspiration.

SANDOZ CHEMICAL WORKS, INC. *61 Van Dam Street, New York 13, N. Y.*
Application laboratories and stocks at Boston, Philadelphia, Charlotte, Chicago, Los Angeles, Toronto. Other branches at Providence, Fairlawn, N. J., and Montreal.

SANDOZ *thinks ahead with textile*

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Excellent Level Dyeing Properties
Very Good Fastness to Light

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Ladies' Dress Goods, Carpet Yarn and Upholstery Materials.

ZINSSER & COMPANY, Inc.
ESTABLISHED 1897
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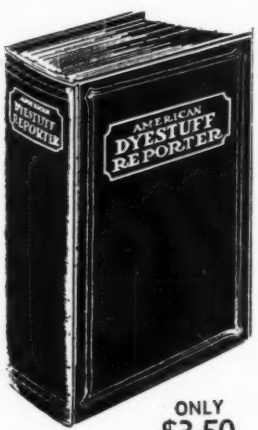
HASTINGS-ON-HUDSON NEW YORK

Have you ordered this handsome Binder for your American

DYESTUFF REPORTER



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BURK-SCHIER

BURKART-SCHIER CHEMICAL CO., CHATTANOOGA, TENN.

• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery wanted or for sale—the rate is $7.50 per column inch or less per insertion.

WANTED—dyer experienced on synthetic—filament and spun—fabrics and blends. Excellent opportunity—employment in south with large, well-established company. All applications must include full details of work experience, background and salary expected. Write Box No. 212.

WANTED SUPERINTENDENT, quality jig dyehouse, metropolitan area, technical education preferred, must have exceptional background as leader of labor and high quality production record. Please describe background details and experience fully. Write Box No. 219.

POSITION WANTED: dyeing tricot fabrics. Good background of tricot dyeing, finishing and testing experience. Write Box No. 216.

POSITION WANTED: Dye and intermediate chemist, BS. Nine years organic chemistry; 10 years in dyestuff industry, research development, analytical control, and production. Locate in Metropolitan area. Write Box No. 220.

WANTED: Southern and N.E. distributor or salesmen for distribution of long established manufacturer's complete line of industrial soaps, detergents, compounds, etc. Splendid opportunity. Kindly give full particulars. Write Box No. 221.

POSITION WANTED: Textile Graduate Engineer and Chemist, with three years experience in hosiery dyehouse as Assistant Dyer and Finisher. Familiar with modern methods of finishing Mono and Multifilament nylon hosiery. Desires progressive position with Mill or Dyestuff Concern. Write Box No. 194.

WANTED: COTTON FINISHING CHEMIST. Experience in cotton and rayon dyeing and finishing essential. Position will require development and evaluation of dyeing assistants and fabric finishes in laboratory or surface active chemicals manufacturer along with technical service duties. Write Box No. 226.

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POSITION WANTED: Colorist, nine years silk screen experience, acetates, silks, rayons, nylons thorough, capable; manufacturing or research; New York City area only. Write Box No. *229*.

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To throw his cloak into the mud!
Tho queenly step it did protect—
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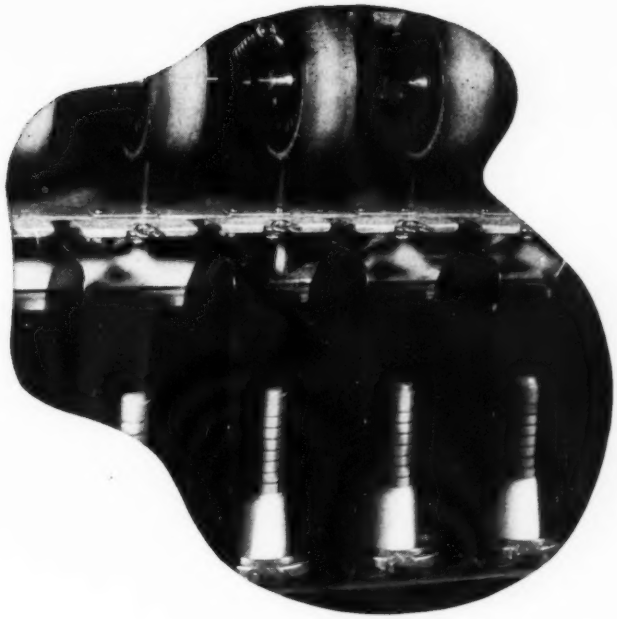

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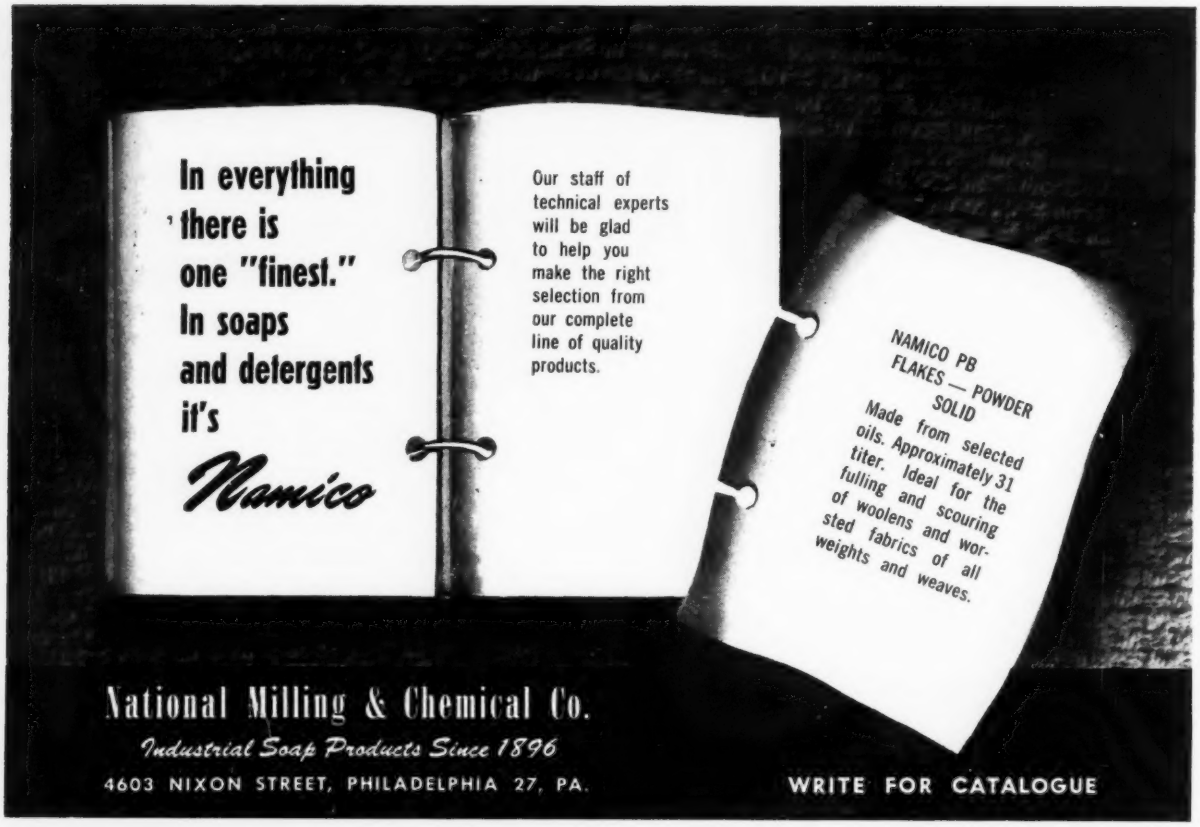
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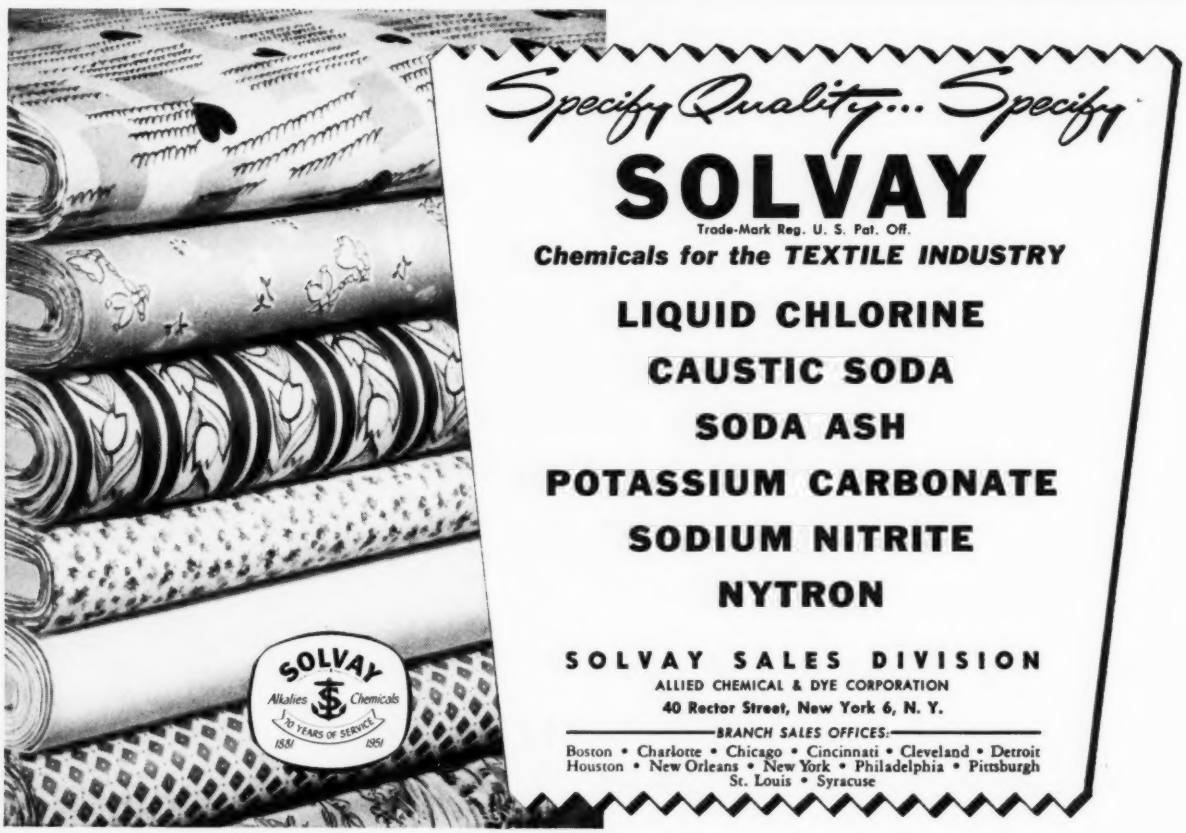
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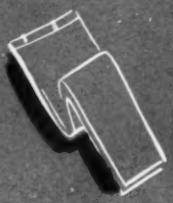

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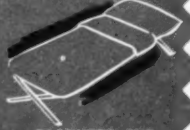

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